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# ARCHIVES

OF

# OPHTHALMOLOGY

*EDITED IN ENGLISH AND GERMAN*

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ARCHIVES OF OPHTHALMOLOGY.

# CONTRIBUTIONS TO THE KNOWLEDGE OF GLAUCOMA.

By Prof. J. SCHNABEL, of Innsbruck.

THIRD ARTICLE.*

Translated (abridged) by Dr. A. Barkan, Prof. Ophthalmology, Cooper Medical College, San Francisco.

THE first two parts of this treatise contain the *résumé* of a number of anatomical investigations, intended to prove that the clinical picture of glaucoma and the obliteration of the sinus of the chamber do not necessarily go hand in hand. The whole surface of the iris may be attached to the cornea, and yet no glaucoma be present. Obliteration of the sinus is frequently observed in eyes of normal tension, and even in eyes evidencing temporary decrease of tension. Authors advocating the theory of obliteration have thus far not attempted to explain why the annular adhesion may sometimes cause glaucoma and at other times fail to do so. As to the opinion entertained by Knies, that iridectomy cures glaucoma, not by excision of the iris, but by the scleral cut, the cicatrix of which allows filtration of aqueous humor, I have shown before that excision of the iris is by no means an indifferent item in the cure of glaucoma, and I now maintain that whilst some scars from iridectomy are broad and yielding, thus allowing the exit of fluid from the chamber beneath the conjunctiva, it is just as certain that most of the scars met with after iridectomy are firm and impermeable to fluid. Cases exceptionally exhibiting the above-mentioned condition of the

* The first article was published in vol. vii., pp. 12–38, and pp. 243–261. The second article in the same vol., pp. 262–310.

cicatrix are considered as poorly healed, and cannot possibly account for the usual regular effects of iridectomy. We know that glaucoma may be healed by iridectomy, and yet the annular adhesion persists unchanged in the sinus of the chamber; we likewise know that the cicatrix after iridectomy does not serve as a compensatory exit for the humors of the eye. This knowledge, however, does not entirely overcome the theory of obliteration. Iridectomy may produce conditions of a kind hitherto unknown, divesting of its evil consequences the obliteration of the sinus. It now becomes necessary to ascertain whether Weber's theory, that increased tension in glaucoma can be caused only by obliteration of the sinus of the chamber, cannot be proved incorrect. In order to avoid mistakes the terms *secretion* and *excretion* of the humors of the eye will be substituted by the terms *infiltration* and *exfiltration.* The aqueous humor passes into the venous channels by means of filtration, the tension of the eye acting as a filtration pressure on their exterior walls, whilst their interior walls are acted upon by the blood pressure, which is much less in this part of the vascular system than in the one where the eye liquid enters the ocular cavity. As soon as the tension of the eye has reached a certain height, it will force liquid from the interior of the eye into the venous channels. The exit of a certain amount of fluid diminishes the tension of the eye, and by thus disturbing the equilibrium between arterial blood pressure and tension of the eye, *infiltration* is caused. This again changes the former equilibrium between the pressure in the eye and that in the veins, and thus new *exfiltration* arises. As a natural consequence the exit of a certain quantity of fluid is followed by the entrance of an equally large quantity of fluid, and *vice versa.*

It has been frequently stated that the increase of eye pressure must be due only to the increase of the *in-going* supply, without a compensating change in the *out-coming* supply, or in the diminution of the efflux without change of the influx, or finally to an increase of the influx with simultaneous decrease of the efflux. Not one of these suppositions is met with in cases of permanent increase of ocular pressure.

Each increase of the inward flow promotes the outflow, each decrease of the latter checks the inward current; a lasting increase of the inward current, with simultaneous decrease of the outward current, does not really exist. The equilibrium between the inward supply and the outward flow exists equally in eyes of normal, increased, or decreased tension; it is dependent upon the force of blood pressure in the circulus arterius major (which supplies the arteries of the ciliary processes), and with it must be either normal, super-, or sub-normal. There certainly exist special contrivances in the normal eye for maintaining the ocular tension at a certain height. These are identical with the arrangements serving to preserve at a medium height the pressure in the ciliary processes, which secrete the intra-ocular fluids.

We cannot agree with Weber's theory, which maintains that increase and decrease of tension are caused by disturbances in the relative quantity of secretion and excretion, for the intra-ocular pressure acts on the one hand as a hindrance to infiltration, and on the other hand is a propelling power for exfiltration—an increase or decrease of the intra-ocular pressure will consequently increase, or respectively decrease, the resistance to infiltration, just as much as the propelling power for exfiltration. Blood pressure is the source of the intra-ocular pressure, and regulates also the circulation of the intra-ocular fluid. For example, a man of thirty-eight years of age exhibited on the left side a narrow palpebral fissure, small pupil, decreased tension, normal vision, refraction, and accommodation; this condition had existed for thirty-three years, and was due to a fall. The patient stated that for over twenty years he had been aware that whenever he exerted himself bodily the left half of his face always remained cool and dry, whilst the right half became hot, and the perspiration ran down it. Decreased tension was therefore a symptom of paresis of the sympathetic nerve on the left side, existing over thirty years. Weber's theory of the mechanism which regulates the intra-ocular tension is entirely insufficient to explain the decrease of tension. Observations, which can be made

daily, sufficiently contradict that opinion. After puncture the anterior chamber is quickly refilled, till the eye has the same tension it before possessed. As much fluid will enter the normal eye as will be required to bring the tension to the normal degree, whereas a greater, or relatively a smaller, amount of fluid will enter an eye the tension of which had previously been increased or decreased. Why does the hypotonic eye not fill after puncture to the same extent as the eye of normal tension? The entrance of a few drops into the interior of the eye would accomplish this. The condition of the eye with respect to circulation, number of blood-vessels, etc., is sound. Why does not the quantity of fluid rise farther in a punctured eye of normal tension, after the medium tension of the eye has been again reached? We well know that the tension is so moderate that it will allow the finger easily to dimple the eyeball, and the sclerotic of a normal eye, especially in the young, would, without difficulty accommodate a larger quantity of fluid than it really does. The answer to all these questions is: That the tension of the coats of the eye can rise to the point, only, when the intra-ocular pressure counterbalances the arterial blood pressure in the ciliary processes—to this point, however, it is bound to rise. The real reason of the maintenance of a medium degree of pressure in the normal eye having been ascertained, we may hope to arrive at an understanding of the anomalies of tension—not only of hypertonic, but likewise of hypotonic, tension. Having reached this point, I desire to direct attention to the results arrived at in the first two parts of this treatise. It was then shown that glaucoma may be present without obliteration of the sinus of the chamber; and that the latter can exist without glaucoma; finally, that glaucoma can be cured without the obliteration of the chamber sinus being removed. This proves the incorrectness of the obliteration theory.

I shall now proceed to examine to what extent the theoretical deductions mentioned before are corroborated by clinical and anatomical experiences gathered from eyes of abnormal tension, and whether the latter can be traced

back to anomalies of tension in the sphere of blood-vessels composing the circulus arteriosus major.

To those who maintain that choroiditis, proceeding with hypersecretion, is the cause of glaucomatous hypertension, we would not only reply that the signs of an inflammatory tissue affection are wanting, but also that, in accordance with former deductions, hypersecretion into the eye, through a lessening of filtration resistances, will necessarily cause excess of exfiltration, and thus cannot alone explain the increased tension. The supposition of a latent choroiditis to support the theory of hypertension, is arbitrary and valueless. Inflammatory affections of the anterior parts of uveal membrane, which receives its blood supply from the long posterior ciliary arteries, proceed sometimes with normal tension, rarely with hypertension, very often with hypotension. The diminution in the filtration resistances, caused by the inflammatory affection of the walls of the blood-vessels, far from causing hypersecretion, do not prove even sufficient to prevent hypotension. From this, it follows that the disturbance which causes hypertension, must not be looked for in an inflammatory disease; we must, on the contrary, suppose that hypertension in an inflamed eye is not the direct consequence of inflammation, but a complication of the same, caused by circumstances of a particular kind. Light is thrown on this point by cases where anomalies of tension are present without any inflammatory disturbances in the vascular sphere of the long ciliary arteries. In typical cases of this sort, disturbances are to be found in the innervation of the blood-vessels of the iris, which, in otherwise perfectly healthy eyes, are met with as a *symptom of paralysis and irritation of the cervical portion of the sympathetic nerve. These cases teach us that paralysis of the arteries of the iris, and myosis resulting from the same, go hand in hand with hypotension, whereas, irritation of the arteries of the iris and mydriasis stand in connection with hypertension; they serve as incentives to discussions of the question, in which way filtration-pressure in the arteries of the ciliary processes may be influenced by the size of the arteries of the iris as found at various times.*

In paralysis of the arteries of the iris, their walls relax and stretch; owing to irritation of the cervical sympathetic, they get narrower and quite tortuous. The speed of the current in the blood of the iris will increase in the first, and decrease in the second case. In consequence of this, the amount of blood and blood pressure in those arteries taking their origin in the circulus arteriosus major of the iris—that is, in the arteries of the ciliary processes—will sink in the first case, and rise in the second. Consequently, *paralytic myosis will produce hypotension, and spasmodic mydriasis will produce hypertension.* Höltzke's researches corroborate this, for he found that the pressure in the anterior chamber of living animals, under certain physiological conditions (that is, without atropia or eserine instillation), rises with the dilatation of the pupil, and falls when the pupil contracts. The same author observed several times a slight fall of the pressure-gauging quicksilver column simultaneously with the contraction of the pupil. He also ascertained in one of his experiments, when the sympathetic nerve had been previously cut, a sinking of the pressure to the extent of three to eight *mm*, whenever the pupil of slightly more than medium size was contracted *ad maximum* by light. As already stated on a former occasion, I have convinced myself by palpation, that eserine decreases not only the tension of an eye affected by hypertension, but also that of an eye with normal tension. Höltzke states that atropia increases the pressure considerably in the anterior chamber, by enlarging the pupil. A pressure-bandage, firmly applied, quickly and thoroughly contracts the pupil, and diminishes the ocular pressure in a very striking manner. So does massage, probably in a similar manner to the bandage, by paralyzing the blood-vessels of the iris by pressure. Warmth, also long-continued applications of cold to the eye, have a relaxing influence upon the blood-vessels of other parts of the body. Myosis and mydriasis act in a similar way, when met with as symptoms in inflammatory diseases of the anterior part of the eye. The former is associated with *hypotension;* the latter, with *hypertension.* The connection existing between myosis and hypotension

is also clearly demonstrated in those every-day cases where a foreign body is superficially lodged, producing irritation of the sensitive corneal nerves and reflex enlargement of the blood-vessels of the iris. The influence which the size of the pupil exerts upon the blood pressure in the arteries of the ciliary body, may explain the beneficial effect of sleep upon eyes that have been suffering from a slight glaucomatous attack, and likewise the influence exerted by some emotions, such as fright, in increasing tension and enlarging the pupil.

Thus it is shown by clinical observations that a regular connection exists between hypertension and paralysis on one hand, and hypertension and irritation of the cervical sympathetic on the other. This is corroborated by experimental excitation of the cervical sympathetic, which, according to Adamück, produces hypertension.

Whilst some authors consider glaucomatous hypertension as essentially different from that hypertension which is observed as a part of non-glaucomatous affections, others look upon the symptoms of hypertension as characteristic of and identified with glaucoma. Those symptoms which we find in connection with hypertension in glaucomatous eyes, and which are lacking where hypertension occurs in non-glaucomatous eyes, teach us that those symptoms are not mechanical consequences of hypertension, but are symptoms of a glaucomatous affection, as may be also inferred from those cases where, notwithstanding the presence of exquisite glaucomatous symptoms, hypertension is either entirely wanting, quite insignificant, or only of temporary duration. Hypertension is a very important symptom of glaucoma, but does not belong to it exclusively. To identify increased tension with glaucoma, means about the same as the equalization of part of a sum with the sum total; to include all affections proceeding with increased eye-ball tension under the term of glaucoma, means the same as equalization of different sums, because they form one part of the sum total in common. Hypertension of non-glaucomatous eyes disappears completely of itself. Hypertension of glaucomatous eyes disappears only

to return after a while, and having lasted a longer time, exhibits only, as a rule, variations of intensity, without entirely disappearing. The conclusion from this is that the cause of hypertension exists only for a short time in one case, and always in the other; not, however, that the acting causes are of a different nature. We have ascertained that the increased blood pressure in the arteries of the ciliary processes causes hypertension in non-glaucomatous eyes; we must logically look for the same cause as an explanation of glaucomatous hypertension. The existence of increase in this blood pressure is demonstrated, *ad oculos*, by anatomical investigations. Whilst it appears probable that active dilatation of the blood-vessels in the ciliary processes, caused by irritation of the vaso-dilatory nerve branches, has at times a prominent share in promoting hypertony, yet in by far the greatest number of glaucoma cases the increase of blood pressure in the circulus arteriosus major and in the blood-vessels of the ciliary processes is undoubtedly due to an affection of the iris.

Let us now direct our attention to the glaucomatous symptoms occurring in the anterior part of the eye, and first consider the changes met with in the iris. Having felt obliged to designate these already, as the causes of increased tension (an important deviation from the modern theory of glaucoma,) I must state my reasons for so doing.

There exists an unmistakable parallelism between the development of mydriasis and that of hypertension. If the latter be absent in glaucoma, or exist only in a slight degree, and be of short duration, then mydriasis is wanting; in chronic glaucoma with continued though moderate hypertension, mydriasis attains only a moderate degree; if glaucoma develops very acutely, and is marked by sudden and great hypertension, it will be found, as a rule, that mydriasis reaches likewise quickly a high degree; in the so-called premonitory stage, mydriasis is observed to develop with each attack of hypertension, and to pass away with it. There exists, therefore, a very intimate, possibly a causal, connection between hypertension and mydriasis. I shall

demonstrate that mydriasis must necessarily become the cause of hypertension, and will have to show first that hypertension cannot be the cause of mydriasis, as maintained by the pressure hypothesis.

The iris possesses nerve fibres which contract the pupil; others which dilate it. Pressure, which paralyzes the first, ought to do the same with the others; a perfectly immovable pupil, *not* a steadily growing mydriasis, ought to be the consequence. It will also be conceded that hypertension should have had some time to act upon the nerve fibres of the sphincter previous to paralyzing them. But hypertension and mydriasis often appear simultaneously. The size and shape of the pupil differ in most cases of acute glaucoma, decidedly so in paralysis of the oculo-motor nerve. Von Graefe knew of two causes for mydriasis: pressure on the nerve fibres contracting the pupil, and progressive atrophy of the iris. This second cause, atrophy of the iris tissue, is only mentioned incidentally, although its existence is undoubted, and explains the characteristic form of the pupil as observed in many cases of glaucoma. As the iris contracts, the pupil expands; the waste of tissue does not extend uniformly over the whole iris, consequently the enlarged pupil must be irregular in shape, and eccentric. That part of the iris which has the most receded from its normal position, always exhibits the greatest defect in its tissue. As it seems impossible to explain mydriasis, we are compelled to look upon it as a consequence of iris atrophy. Mydriasis is not an independent symptom of glaucoma; it is contained in the glaucomatous atrophy of the iris. The mydriasis, however, which appears suddenly in acute glaucoma, and the one liable to disappear during the premonitory stage, cannot at all, or, at least, only partially, be explained by atrophy of the iris. The pressure-paralysis of the sphincter nerves being likewise an insufficient explanation, we arrive by mere exclusion at the result that the development of these inflammatory and transitory forms of glaucomatous mydriasis arises from excitation of the nerve-fibres enlarging the pupil. In conformity

with this are the three symptoms:—enlargement of the pupil, increase of tension, and decreased sensibility of the cornea occurring in glaucoma, met with also in cases of pathological excitation of the cervical sympathetic, and in experimentally produced excitation of the intra-ocular fibres of the sympathetic by instillation of cocaine. Glaucomatous mydriasis is at times produced by glaucomatous atrophy of the iris, at other times by excitation of the nerve fibres enlarging the pupil, and sometimes both factors co-operate.

The tissue-changes of the iris affected with glaucomatous degeneration, recognizable with the naked eye, are the narrowing and thinning of the iris, discoloration and new formation of pigment; the walls of its arteries are thickened, they assume a white color, the veins become distended and their walls thinned. Consequent on the narrowing of the margin of the iris, the circulus arteriosus minor borders sometimes closely on the pupillary edge. Consequent upon the thinning of the iris, its front surface becomes in places uncommonly smooth, groove-like indentations are formed, and the blood-vessels exposed. Discoloration shows itself by the paling of the whole of the iris, and scattered slate- or lead-colored spots are seen in the ciliary region. The white prominent walls of the arteries present a striking appearance, particularly in very fresh cases of acute glaucoma, whilst the enlarged veins are easily recognizable in older cases of so-called inflammatory glaucoma. The glaucomatous affection of the iris may be developed insidiously or stormily. Sometimes it proceeds steadily, at other times by fits and starts, towards higher and higher degrees of degeneration. But the glaucomatous iris does not at any stage of its development exhibit the characteristics of a new formation of tissue, of increase of substance; on the contrary, the symptoms of degeneration predominate, even in the most acute course. The glaucomatous affection of the iris may have reached its highest degree, yet the eye may never have been very red or painful, neither are any traces of new formation of inflammatory origin found at the pupillary margin or in the pupillary area. The iris of a glaucomatous eye shows from the very beginning disturbances only

of circulation, and atrophy. All changes to be observed during years of progressive glaucomatous affection of the iris, always belong to these two categories of disturbed circulation and atrophy of tissue; the process of disease even cannot be considered under the head of inflammation, although accompanied by pain, ciliary injection, and the exit of white and red blood-corpuscles into the tissue of the iris. The walls of the iris arteries lose their elasticity and their lumen is narrowed by hyaline degeneration and thickening. From this results, on the one hand, insufficient nutrition and atrophy of the tissue of the iris, and, on the other hand, increase of pressure on, and enlargement of, the circulus arteriosus major, and of the blood-vessels of the ciliary processes, leading to increase of intra-ocular pressure. But even the highest degree of irritation in mydriasis, the very acute development of which I have observed in hysterical individuals, do not produce glaucoma, only hypertension in a considerable degree, which disappears spontaneously after a while.

In seeming contradiction to this observation is the well-known fact, that the instillation of a weak mydriatic, a very weak solution of atropia, or a drop of homatropine, into an apparently healthy eye, may be followed by the outbreak of acute glaucoma; whilst much stronger mydriatic agents will be tolerated by an immense number of other eyes without their experiencing any injury. We are thus obliged to suppose that in the eyes of the first class, degeneration of the iris, peculiar to glaucoma, is already developing, though so slowly, or with such slight intensity, that no striking clinical symptoms of glaucoma had as yet been evidenced. If we consider further, that premonitory attacks of glaucoma are produced by fright, serious excitement, great hunger, and may be obviated by quiet, sleep, appeasement of hunger, there will be little reason to doubt that glaucomatous hypertension may be produced by excitation of the fibres of the sympathetic enlarging the pupil and vaso-contracting nerves of the iris arteries. This mydriasis, due to excitation, needs a predisposed soil to cause an attack of glaucoma, and this predisposition is caused by

the condition of hyaline degeneration in the arteries of the iris. The changes in the anterior part of the eyeball, the increased pressure in chronic, painless, steadily advancing cases of glaucoma, where ciliary injection, œdema of the subconjunctival tissue, etc., are entirely wanting, may be fully understood by presupposing a glaucomatous degeneration of the arteries of the iris; glaucomatous attacks imperatively demand the supposition of a condition of excitation, which comes on very abruptly, affecting the contracting fibres of the sympathetic which supply the arteries of the iris. As a consequence of simple excitation of the sympathetic, mydriasis, hypertension, and decreased sensitiveness of the cornea are observed, but no glaucoma; we are therefore compelled to presuppose the same predisposition, caused by insidious development of hyaline degeneration of the walls of the iris arteries, in cases of acute and fulminant glaucoma, as well as in the premonitory attacks and in atropine glaucoma.

Thus far the glaucoma symptoms observed are those exhibited in the anterior part of the eye. Different as are the organs of that part, not a single one remains intact. Sclera and cornea, iris and corpus ciliare, lens, aqueous and vitreous humors, all become affected, owing to disturbances of circulation and their consequences. The long and the anterior ciliary arteries are the seat of those long continued disturbances of circulation, which are met with in the blood-vessels of the iris and have two causes; the one developing slowly, increasing steadily, and acting uninterruptedly—viz., the hyaline degeneration of the arterial walls; the other setting in suddenly, attaining rapidly to a high degree, and producing only a passing effect, is the spasmodic contraction of the blood-vessels. Hyaline degeneration of the walls of the arteries cannot be removed, only checked, by therapeutics. Spasm of the blood-vessels is amenable to cure. It is often removed by eserine, pilocarpine, and morphine, by sleep, food, chloroform-narcosis, and inhalation of nitrite of amyl. Although these remedies will not prevent recurrences of the spasm, iridectomy, and sometimes sclerotomy, will effectually do so. Thus, taking into

consideration that an operation cures the attack of glaucoma; that it not only prevents a return of similar attacks, but causes also a cessation of the further progress of hyaline degeneration of the arteries of the iris, we are obliged to suppose that this procedure removes the excitation of the vaso-constrictor nerves of the iris, and thus indirectly checks the process of degeneration.

Let us now examine the group of glaucomatous symptoms found around the optic disc. We shall do so inductively, and without reference to what we have ascertained already; but will make an independent examination as to the connection and development of those symptoms.

A fact primarily to be considered is, that in a very great number of cases of glaucoma a peculiarly formed excavation follows the condition of the pathological hypertension. The question arises—How is the excavation developed? To which the pressure theory replies: By overburdening of the papilla the surface—presuming, at the same time, that the lamina cribrosa is unable to resist the intra-ocular pressure, which has become pathologically increased. This hypothesis is applicable only to a majority of all cases of excavation, and the theory of a lack of resisting power on the part of the lamina cribrosa is merely an unproved supposition. Respecting those refractory cases of excavation which proceed without increase of tension, it has been asserted that the increased intra-ocular pressure was really acting, therefore existing, but could not be demonstrated. This is an arbitrary and forced supposition.

We have been unable thus far to explain the process by which the cornea is rendered unable to resist normal pressure in the formation of keratoconus; yet no one has found any cause for protesting against the supposition that keratoconus is due to a peculiar softening process. The cornea is bulged forward—this constitutes one fact; at the same time the pressure remains normal—this is the second fact; and that even at the greatest height of intra-ocular pressure the cornea does not bulge out, constitutes the third fact. One is thus bound to arrive at the conclusion that keratoconus is due to a decreased power of re-

sistance in the cornea. At times the papilla becomes excavated by normal pressure; the excavation of the papilla is also sometimes wanting, although the intra-ocular pressure is at its highest; why not suppose that this is also due to the loss of local power of resistance? Our ignorance of the process of softening in the cornea, which is transparent, is more surprising and disturbing than in the case of the papilla. I fail to understand why the morphological connection of the glaucomatous as well as the non-glaucomatous excavations of other parts of the walls of the eyeball should be entirely disregarded, and why the cause for formation of the first should not be sought, where it has already been recognized in the last. By supposing that the glaucomatous excavation of the papilla, like all other excavations, is caused by a local process of softening in the tissue, opposition against a series of undoubted facts becomes unnecessary, in support of the supposition that the lamina cribrosa is unable to afford resistance to the undoubted increase of intra-ocular pressure; neither will it be necessary to exclude diseases of an undoubtedly glaucomatous nature from the group of glaucoma, nor to maintain that intra-ocular pressure is increased, when it cannot be demonstrated by the most conscientious examination. Had the pressure theory been superseded by von Jaeger's views of the glaucomatous optic-nerve affection, it would have been necessary to trace the peculiar features of the disease to the inexplicable qualities of a process in and around the optic nerve, the nature of which is at present unexplained. All knowledge concerning the glaucomatous affection of the optic nerve is exceedingly uncertain—in reality, not much more than an indispensible postulate. I have become firmly convinced, however, that it is by no means rarely present previous to increase of tension. The interesting question next arises, whether the head of the optic nerve of the seeing glaucomatous eye is excavated, as we are led to believe from an ophthalmoscopic examination, or whether, as stated by Mauthner, it is of a normal shape and transparency, and has become invisible. So far as those cases of excavation are concerned which I have seen, I

must state that, without a single exception, I have found Mauthner's statement incorrect. The mass of nerve fibres is to be seen in the glaucomatous excavations between the blood-vessels, between them and the optic-nerve sheath, behind the blood-vessels on the floor of the excavation and in the gaps of the lamina cribrosa; and it appears to me absolutely certain that Mauthner's opinion concerning the complete absence of nerve fibres in the central cavity is a mistake, and is caused by an erroneous supposition. The excavation, which is the second important symptom of the glaucomatous optic-nerve affection, certainly does exist. I had occasion to observe the conditions under which it developed in a case of fulminant glaucoma of both eyes, where glaucomatous excavations exhibited themselves only after successfully performed iridectomies. In this accurately observed case, (fully described in the German edition—Tr.), loss of transparency and a dirty-reddish discoloration of the papilla preceded the commencement of the glaucomatous change in the shape of the papilla; this was accomplished by the narrowing of the single parts of the ring of nerve fibres and a sinking in of its anterior surface. The glaucomatous optic-nerve ring was still wanting when the glaucomatous excavation was completely formed; within eight days subsequently it was nearly completely developed. During the whole time in which the excavation and the optic-nerve ring were forming, the lamina cribrosa did not show the slightest change in position. The formation of the excavation commenced eight days, and the formation of the ring twenty-five days, after the iridectomy. Whilst the excavation was developing, the tension remained normal and the lamina cribrosa unchanged in its normal position. Vision and field of vision improved steadily. The most important deduction from this observation is the following: The excavation, even in eyes suffering from glaucoma, with highest increase of tension, is due to a peculiar affection of those parts of the optic nerve which are situated between the lamina cribrosa and the level of the retina. Like the glaucomatous discoloration, this affection is independent of hypertension, is rooted in the optic nerve itself,

occurs only as a part of the glaucomatous disease, and therefore deserves a name of its own, for which we must retain the one given by Jäger: "*glaucomatous optic-nerve affection*," as long as a thorough anatomical research does not enable us to use a more characteristic one. The glaucomatous excavation is not a pressure excavation ; hypertension helps only to develop it quicker and to a higher degree. The receding of the lamina cribrosa is not a necessary supposition for the development of glaucomatous excavation. The latter is due to shrinkage of the elements of the connective tissue of the optic-nerve head.

Although the optic-nerve ring is an affection of the choroid, v. Jaeger added it to the symptoms of disease of the glaucomatous optic nerve, owing to its unmistakably regular connection with the glaucomatous changes of color and shape of the optic nerve. Together with these changes, this symptom is found to be best developed when hypertension is present ; it is sometimes observed previous to the excavation, and at times is developed with it, without a receding of the lamina cribrosa—the tension of the eye being normal ; I cannot agree with v. Jaeger in considering the yellowish color of the ring a regular attribute of the same. I have seen it to be blackish-gray and grayish-white ; and it is caused by a simple progressive atrophy of the corresponding zone of the choroid. The quickness of its development in the case before mentioned seems very remarkable, as it is well known that Schweigger found the choroid changed within the circle of the glaucomatous optic-nerve ring into a much thinned, transparent membrane. The choroid was ossified within that ring in a case I examined.

The anatomical condition of the glaucomatous optic-nerve affection is yet unknown. The clinical aspect is made up of the three symptoms just mentioned, and may be included under two categories, viz.: disturbed circulation and atrophy. To the first belong the redness, observable at the beginning, and the subsequent paling of the disc of the optic nerve ; to the latter belong the progressive atrophy of the supporting tissue which holds together the nerve fibres of the papilla, and the atrophy of the zone

of the choroid surrounding the disc. The opinion long entertained that the compression of the optic-nerve fibres and the kinks observable on the margin of the excavation are the causes of visual impairment in glaucoma, is being gradually abandoned. Von Graefe was the first to trace impairment of the retinal function in acute glaucoma to ischæmic paralysis of the retina by suddenly developed hypertension. In order to ascertain whether the glaucomatous disturbance of circulation in the retina is produced by pathological increase of tension, we shall proceed in a similar manner to the one pursued in our investigations respecting glaucomatous mydriasis; and shall endeavor to ascertain whether the symptoms in the retinal system of blood-vessels in the glaucomatous eye are the same as those artificially produced by pressure in the healthy eye. Pressure on the surface of a healthy eyeball impedes circulation in the whole extent of the retinal blood-vessels. All the retinal blood-columns, both arterial and venous, become narrowed and flattened, the reflexes of the blood-vessels disappear or grow indistinct, those parts of the walls of the blood-vessels usually visible broaden, those usually invisible become visible, and the papilla pales.

Artificial increase of the intra-ocular pressure causes, therefore, a decrease in the whole retinal blood supply. The occurrence of the so-called arterial pulsation plainly shows a sinking of the medium pressure in the blood-vessels of the retina, so that it becomes insufficient to keep the arteries of the retina dilated during the diastole of the heart. Artificial increase of the intra-ocular pressure diminishes in a marked degree the rapidity of the current in the retinal vessels, and the column of blood in the veins breaks into red granules and then into white and red small cylinders; the movements of these granules and of the white and red cylinders, inside the lumen of the blood-vessels respectively, can be clearly observed. As far as my knowledge of literature extends, attention has not yet been directed to the phenomenon just described.

This experiment, which may be easily made at any time proves the correctness of the explanation given by v. Jaeger

for this disturbance in the circulation, namely, that it is due to retardation of the blood current. Embolism of the central artery is one of the causes of such retardation. V. Arlt states that an increase in the size of the trunks of the veins, previous to their entering the field of the papilla, might be effected in a healthy eye by a moderate pressure with the finger, and therefore considers the same symptom occurring in an eye with an excavation, due to an increase of the intra-ocular pressure. I have, however, always found that, in the eye pressed upon from the outside, the veins become very distinctly narrower and flatter, not only on the papilla, but far beyond its limits, and I certainly agree in this respect with all authors who have studied the condition of the retinal blood-vessels in the eye when pressed upon. To study thoroughly the considerable, even colossal, enlargement of the retinal veins in the glaucomatous eye in which the arteries are narrowed and pulsating, such eyes should principally be examined as come under observation shortly after the first attack of acute glaucoma, when every indication of an excavation is wanting, because in these cases the suspicion may be excluded that the receding of the lamina cribrosa and the bending of the blood-vessels at the margin of the excavation have caused the anomaly in the calibre of the retinal blood-vessels. If such eyes are pressed upon, all the retinal blood-vessels become narrower; this is also the case in the normal eye when pressed upon, clearly showing that enlargement of the veins cannot be due to increase of intra-ocular pressure. Enlargement and tortuousness of the veins and abnormal redness of the papilla in the glaucomatous eye, with contracted pulsating retinal arteries, are proofs that, besides the increase of the intra-ocular pressure, there must exist another obstacle to the circulation. As the arteries are not filled and the veins not emptied to the normal extent, we must look for the obstacle in the arteries, for as the propelling power of the arterial blood is being diminished, that of the venous blood must sink, consequently the arteries become emptier and the veins fuller than in their normal condition. The obstacle to the arterial current may be caused by the interposi-

tion of abnormal resistances, or by the increase of normal resistance; by changes in the walls of the blood-vessels, by loss of elasticity and lessening of their calibre thereby; or by increased tonus of the arterial walls, and spasm of the muscles of the arteries.[1] Hemorrhages into the retina—not rarely observed, especially after acute attacks of glaucoma, and after iridectomies performed in cases of so-called acute inflammatory glaucoma—are explained by a pathological fragility of the walls, resulting from an affection of the walls of the blood-vessels.

Another important proof of the existence of serious disturbances in the retinal arteries, is presented by the occurrence of the bulging and excessive tortuousness of the small papillary veins. That this anomaly of the veins is independent of the formation of an excavation and increase of tension, has become evident to me by the observation of two cases presenting a formation of coils[2] in the small papillary veins, although excavation was entirely absent in both of them and increased tension in one. To these clinical experiences may be added the anatomical researches of v. Graefe, Poncet, and Brailey. This last author examined the retinæ of twenty-three eyes affected by primary glaucoma without hemorrhages, and found eight in which the arteries exhibited hyaline degeneration, thickening of the walls, and a diminution of their calibre amounting to complete closure, and in which the walls of the capillaries were affected by hyaline degeneration and aneurismatic enlargement. His excellent researches have proved that the cause of arterial anæmia and venous hyperæmia is the same in the retina as in the iris, and that the glaucomatous affection of the latter has its analogy in the glaucomatous affection of the former. Those glaucomatous disturbances of sight, occurring suddenly and lasting only a very short time, seem to indicate the probability of an occurrence of spasmodic contraction of the blood-vessels, and consequent ischæmia of the retina. It is insufficient to explain arterial ischæmia of the glaucomatous retina by mere increase of tension; the

[1] By pressure upon the artery previous to its entrance.—Ed.

[2] Often met with in ret. Bright.—Ed.

explanation must be found in the clinically and anatomically proved existence of a retinal affection peculiar to the glaucomatous eye, which exhibits itself, like the glaucomatous affection of the blood-vessels of the iris, by degeneration of their walls and temporary spasms of their muscles. The glaucomatous affection of the retina, like the glaucomatous affection of the iris and optic nerve, is not present in each case of glaucoma, nor during all stages of the affection. Brailey's researches prove that it is frequently completely wanting.

The connection between glaucomatous affections of the iris and retina is usually developed in such a way that both parts of the glaucomatous process appear simultaneously, and co-exist afterwards either for only a short period, in a manner distinctly recognizable, as in the so-called premonitory stage, or permanently, in the so-called inflammatory glaucoma, in both its chronic and acute form. At times, however, the glaucomatous affection of the retina precedes that of the iris, existing for weeks and months without any recognizable deviation from the normal condition of the anterior section of the eye. As increased tension is only a symptom of the glaucomatous affection of the iris, every trace of a pathological increase of pressure will be found wanting whenever a glaucomatous retinal or optic-nerve affection occurs alone.

As to the connection between the degeneration of the walls of the blood-vessels and the spasms of the latter, which unite in producing glaucomatous affection of the retina, I believe I am justified in assuming the affection of the vaso-motor nerves to be the primary condition and that it produces degeneration of the walls. It has been already mentioned that the spasm of the retinal blood-vessels seems to explain the premonitory visual disturbance and the possibility of preventing the return of the same, as well as the formation of lasting glaucomatous changes by a speedy iridectomy. Glaucomatous disturbance of sight is not dependent on increased tension, and the operative removal of the same cannot therefore be the cause of the restoration and preservation of sight by iridectomy. This operation

seems to remove, in a manner thus far not entirely understood, the pathological condition of excitation of the vasomotor nerves of the retinal blood-vessels, and a stop is thus put to the progress of degeneration of their walls.

As regards the glaucomatous optic-nerve ring we must await further explanations, in order to ascertain whether the glaucomatous process causes, at times, changes in the blood-vessels of the choroid, similar to those found by Ulrich in the blood-vessels of the iris, and by Brailey in those of the retina. Investigations of the sclerotic, in this respect are also wanting; but discoloration of the sclerotic, its peculiar rigidity, the fatty degeneration of the connective-tissue cells (observed principally by Coccius), the thinning and formation of ectasias which occur in some parts of the sclera in the late stages of the glaucomatous process, render it very probable that the nutrition of the sclerotic is interfered with by a peculiar affection of its vessels.

No unanimity has yet been reached touching the cause or starting-point of glaucomatous inflammation, nor of its mode of spreading and characteristics. This is certainly sufficient to ratify "the general concurrence of opinion" established by Graefe, the disturbance of which by v. Jaeger and his pupils is so deeply regretted by Jacobson. In no part of ophthalmology are slight knowledge and great positiveness so closely allied as in the teachings concerning glaucoma. Jacobson errs in stating that a new understanding is requisite as to what should be termed glaucoma; for the diagnosis of this affection does not depend upon the glaucoma theory of the diagnosticians, and followers of very different theories agree in terming identical cases glaucoma. Unlimited confusion, however, reigns in the theoretical teachings concerning glaucoma, owing to the vaunted pressure theory, which forms an arena for a doubtful hypothesis, and of auxiliary hypotheses, themselves sorely in need of assistance.

In order to establish a basis for a glaucoma theory, we must entirely set aside the existence of a pressure hypothesis, and subject each symptom occurring in glaucoma to a fresh, thorough, unprejudiced investigation. It will then be

discovered that at present we possess only one work, free from all theoretical prejudice, which treats of the occurrence and course of glaucoma—a work not explaining, but describing glaucoma in a masterly way, and which is therefore destined to form the basis of a glaucoma theory. This work was published by my lamented teacher, Edward von Jaeger, in the year 1858. According to this author, glaucoma symptoms may be classed under two well-defined groups. The one embraces the glaucoma symptoms known of old, and is formed within the field supplied with nourishment by the blood-vessels of the choroid; the other is visible only with the ophthalmoscope, and is seated in that part supplied by the blood-vessels of the sclera—glaucomatous affection of the optic nerve or sclerotic. The latter disease sometimes precedes that of the choroid, at other times it follows it, or both are simultaneously developed. If, however, one group of symptoms is developed to a certain degree, then the other group is also always developed; and this regular steady development of the process in all parts supplying nourishment to the eye, for the central blood-vessels also become affected, although in a lesser degree, is a most remarkable peculiarity distinguishing the glaucomatous process from all others occurring in the eye.

The point from which the disease starts is not to be found in any special part of the eye, for the whole course seems to indicate that the disturbance arises from a *starting-point common to different parts supplying nutrition, and must therefore be more remote.* The slightness of the material changes in the glaucomatous eye is remarkable, the disturbances are mostly functional, and there appears to be great difficulty, if not an impossibility, of spontaneous reparation. The nature of the process is entirely unknown, but it belongs undoubtedly to regressive metamorphosis. The process probably makes its appearance not only in the eye but also in other organs, and without creating a precedent, but merely to acknowledge the peculiarity of the process, the term *gout* might be adopted for a while. As v. Jaeger does not know the nature of glaucoma, he cannot explain its symptoms; he is, however, of the opinion that the excava-

tion in glaucomatous affection of the optic nerve has been very erroneously distinguished from amaurosis with excavation of the optic nerve, and is due to local decrease in the power of resistance by the glaucomatous process, but not to the increased intra-ocular pressure. The development of the peculiar glaucomatous process is sometimes attended with inflammatory symptoms, which, however, are not essential, as it is developed even to the fullest extent without those symptoms; they only represent the form in which glaucoma may appear. It has for a long time been agreed upon that discoloration of the sclerotic, enlargement of the anterior ciliary blood-vessels, mydriasis, atrophy of the iris, and impairment of vision may be developed to a high degree in the glaucomatous eye without signs of inflammation. According to von Jaeger, then, these symptoms are glaucomatous.

I must now proceed to mention the very remarkable statement made by v. Graefe in his preliminary notice on the nature of glaucoma. In that notice he declared that the change noticeable at the entrance of the optic nerve (which at that time was looked upon as an elevation) was a consequence of diseased circulation in the central artery, and that the manifold other changes in the eye were caused by the anomalous and limited circulation in the ciliary blood-vessels. The summing up of the changes to be observed in the choroid as well as in the iris consists in atrophy of the tissue, obliteration of part of the arteries, enlargement of some venous trunks, maceration of the pigment, occasional œdematous infiltration, and hemorrhages. All these changes, which are not characteristic of inflammation, can well be referred to disturbances in nutrition, caused by diseased blood-vessels.

After all that has been said on different sides, glaucoma is, according to our theory, an affection of the ocular blood-vessels, developed either successively or simultaneously in the areas through which the blood-vessels of the long posterior and the anterior ciliary arteries extend, and probably in the area supplied by the posterior ciliary arteries. The affection of the blood-vessels consists in spasms of the

arteries and degeneration of their walls, and according to the share which the two components of the vascular disease have in certain cases, the glaucomatous disease manifests itself in an acute, subacute, or chronic form. The fact that the glaucomatous process is a systemic and not an organic affection of the eye, explains why no membrane of the eye, and no part of the kernel of the globe, remains healthy. Glaucoma, therefore, represents only a general ocular affection, and holds no place in a system of affections of the eye based upon the anatomical sequence of the diseased parts, and must be treated in connection with each part. The localizations of the glaucomatous process are best known in the iris, retina, and optic-nerve. The structure and function of each of those organs differ; consequently, also, the glaucomatous changes recognizable during life. The circulation in the blood-vessels of the attacked organs is disturbed, their tissue exhibits progressive atrophy, their functions steadily decay. If disturbance in the circulation of the retina is principally caused by steady progressive degeneration of the walls of the blood-vessels, then the loss of functional power ensues gradually. If it is caused by sudden spasms of the blood-vessels, the retinal function is suddenly lowered, and rises to its former standard according to intensity and duration of the spasm, or remains lastingly diminished or entirely destroyed. And here I may be permitted to state that the results of one hundred and thirty-six examinations of the field of vision of seventy-seven glaucomatous eyes in fifty-nine individuals, tended to prove that most ophthalmologists are mistaken in supposing that the field of vision is principally contracted on the nasal side. Examinations show it to be contracted pretty evenly on all sides, so much, in fact, that the term "concentrically narrowed" may be deservedly applied. There is, therefore, no explanation required why the field of vision is generally limited on the nasal side. The fact to be explained, and the explanation of which has been attempted in different ways, does not exist. The average visual field obtained by me from one hundred and thirty-six and one hundred and twenty-six examinations respectively, is 19.8° and 21.9° re-

spectively on the nasal, and 19.1° and 22.6° respectively on the temporal side, smaller than the normal. If, notwithstanding this surprising equality of the loss of the field of vision at both ends of its horizontal diameter, an opinion could be arrived at that the narrowing takes place principally from the nasal side, and, moreover, that this form of narrowing is characteristic of glaucomatous disturbance, then it might very probably be traced to the fact that the healthy and not the diseased parts of the visual field were compared, and that the position of the limit of the visual field relatively to the centre, changed by the disease, had been principally taken into consideration, and sufficient weight had not been laid on the fact that the distance of the lateral limit from the centre of the normal field is nearly twice as great as the distance from the medial.

In the glaucomatous affection of the optic nerve, the disturbance during life in the circulation is characterized first by dull redness, later on by a paling of the papilla; atrophy is recognizable in the formation of the excavation, and visual disturbance (which thus far cannot with any certainty be separated from that caused by the retinal affection) by development of the glaucomatous optic-nerve ring. Each part of the glaucomatous affection makes its appearance either in an acute or chronic form, and the natural division may therefore be considered as *acute* and *chronic* glaucomatous affection of the *iris*, *retina*, and *optic nerve*.

# PROLAPSE OF THE RETINA INTO THE ANTERIOR CHAMBER OF THE EYE FOLLOWING DISLOCATION OF THE LENS INTO THE POSTERIOR CHAMBER.

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(*With figs.* 1 *and* 2 *in plate v. of vol. xv.*)

Translated by Dr. J. E. Weeks.

IT is well-known, that, in perforating injuries to the fibrous coat of the eye and in large perforating ulcers of the cornea, when the lens and a portion of the vitreous escape, the retina may be found lying in the wound. In the literature on dislocation of the lens into the posterior chamber of the eye, I fail to find mention made of a case where, without injury to the sclerotic or cornea, the retina has appeared in the anterior chamber. For this reason I feel justified in reporting the following case, which also possesses other points of interest.

Josefa S., æt. thirty-five years, seamstress, is slightly anæmic. Was well up to March, 1884, when she experienced rheumatic pains in the left shoulder which persisted for some months. For nineteen years the patient has suffered from the results of a blow from a barn fork on the left eye. After receiving this injury she was insensible for some hours and had to be carried into the house. Great ecchymosis of the lids occurred, and it was some days before the eye could be seen. Some time after she received the injury, the patient, on looking into the mirror, noticed a white body lying in the pupil. During the last six years, this white

body has been very prominent. The patient has had only perception of light in the injured eye, ever since the injury occurred. A slight degree of divergent squint exists in the left eye.

The conjunctiva, cornea, and iris, are normal. The pupil is wide and reacts readily to light. A white, opaque, folded membrane occupies the pupillary space, (see fig. 1). On movement of the eye, or sudden turning of the head, *both* membrane and iris are thrown into tremulous motion.

A very small portion of the pupil, at the lower and inner part, is free and appears black. Oblique illumination shows that the folded membrane, which, by the ophthalmoscope, is seen to be detached retina, bulges into the anterior chamber. This bulging is most noticeable in a long slanting fold traversing the centre of the pupil, and in the upper outer portion of the membrane, which likewise reaches into the anterior chamber. The iris does not lie in an even plane but is pressed forward above. The lower portion of the membrane, which can be seen in the pupillary space, lies far back of the plane of the iris; its details can only be determined with the ophthalmoscope.

If the patient bends her head forward, the membrane comes farther into the anterior chamber; this is particularly appreciable in the long fold alluded to above. This position also causes the iris to fall forward, its slanting position becoming much more marked.

By retaining the dorso-recumbent position for some time, the retina is made to leave the anterior chamber of the eye almost entirely. If the pupil is dilated with atropine the temporal part of the retina becomes more prominent. If eserine is used, the retina recedes from the anterior chamber to a certain extent, but the remaining portion, especially that to the upper outer side, is more prominent. Changes in the position and form of the bulging retina are produced when the patient lies on either side. No vessels can be seen on the detached and bulging retina.

By ophthalmoscopic examination, after the pupil has been dilated with atropine, the retina is seen to be detached in all parts except in the inner lower quadrant. The disc is covered by the floating retina. The optic media are clear.

In that portion of the fundus where the retina still remains attached, the refraction of the eye is hypermetropic 5 D. The accompanying cut (see fig. 2) represents the appearance of the fundus in the upright image. A tendinous stripe, bordered by a broad band of pigment, appears in the upper part of the fundus; it extends, slightly curved, toward the temporal side. In some places the pigmented border is irregular. Above it is almost entirely wanting, and the outlines of the stripe are less distinctly marked. The change above described, lying as it does in the choroid, is probably a cicatrix resulting from a rupture of the choroid. A second cicatrix, resulting from rupture of the choroid, appears below and to the nasal side; this one has a meridional direction (recognized as a very uncommon course for rupture of the choroid), and divides into two branches as it approaches the periphery, one branch becoming more equatorial in direction. A tendinous patch (near the middle of the cut), partly bordered by pigment and covered with numerous irregular pigment spots, can be seen near the border of the detached retina, evidently indicating the position of a third rupture of the choroid.

The central vessels of the retina are very small, however, at the posterior pole, their double contour can still be distinguished. Their walls are much thickened, and appear as white lines inclosing a thin blood stream. The retinal vessels pass over the ruptures in the choroid.

The undetached portion of the retina, at the equator, is covered with numerous, irregular patches of pigment. Some of these patches resemble bone corpuscles in shape, and are distributed throughout the nerve-fibre layer of the retina, accompanying the retinal vessels; others are found in the deeper layers of the retina. These patches of pigment also extend over the ruptures in the choroid in many places. This peculiar form of pigmentation includes only the sector of a zone at the equator of the eye, the peripherical portion of the retina remaining free from pigment.

Numerous small, glistening, yellowish-white spots can be seen at the periphery of the fundus, arranged singly or in groups; some of these spots are surrounded by a dark

zone. A few similar spots are found in the fundus, near the posterior pole. These bodies lie in the posterior layers of the retina, and are undoubtedly hyaline excrescences of the choroid. In the parts of the choroid that can be examined with the ophthalmoscope, the pigment epithelium is atrophic. The intervascular spaces appear enlarged and deeply pigmented.

In examining the periphery of the fundus below, a well-defined, circular object is noticeable, which is easily recognized as the cataractous lens. Only a small portion of this body is visible. On the temporal side the lens is covered by the detached retina. Functional examination shows that vision is reduced to perception of light, in the detached portion of the retina.

If a lamp be held in the lower part of the field, the light from it can be distinguished; if held in the upper and outer portion of the field (corresponding to the attached portion of the retina), no light is perceived.

The tension of the globe is slightly below normal.

*Diagnosis.*—Dislocation of the lens into the posterior chamber; partial detachment of the retina, with bulging into the anterior chamber; numerous ruptures of the choroid; atrophy of the choroid; typical retinitis pigmentosa in the undetached portion of the retina.

It is apparent that no benefit could be obtained by treatment in this case.

The right eye is normal, and is emmetropic. $V = \frac{20}{20}$.

Because of the bulging of the retina into the anterior chamber (a condition not before described), the foregoing case appears to me to be worthy of notice. The apparent increase in the size of the prolapse where the head is bent forward and when the pupil is dilated (perhaps the increase is illusory), the return of the retina to the posterior chamber when the patient assumes the dorso-recumbent position, and a diminution in the size of the bulging portion when the pupil is small, are phenomena which resemble those observed in the, so-called, spontaneous mobility of the lens. (Heymann.)

The partial pressing forward of the iris by a portion of

the retina, and the change in the form of the prolapsed retina when the patient lies on his side are also interesting phenomena.

The conditions for the change in the position of the retina in this case appears to have been particularly favorable. In this, as in the majority of cases of dislocation of the lens into the posterior chamber, the vitreous became liquefied and the extensive detachment coupled with the slight difference in specific gravity between the retina and liquid vitreous made the change in position possible. In cases of dislocation of the lens, with accompanying detachment of the retina, prolapse of this membrane does not appear to have been noticed, for the reason, I believe, that it cannot occur without some further complication.

A rough measurement with a piece of thread of the temporal side of the retina, in a horizontal section of an eye, would indicate that a simple total detachment of the retina is not sufficient to permit it to enter the anterior chamber. It is necessary that the retina should become detached either from the disc or from the ora serata before it can enter the anterior chamber and lie there in folds. Probably partial detachment from both disc and ora serata had taken place in this case.

The fibres from the optic nerve that are distributed to the upper and outer portion of the retina were undoubtedly intact. This would account for the preservation of perception of light in the detached portion of the retina. A rupture of the retina, near the disc, extending meridionally, might occur without destroying these fibres.

It is a well-known fact that the detached retina may retain quantitative perception of light for years. The condition of partial retinitis pigmentosa is a peculiar feature in this case—a condition that has never before been described. That the change is confined to one side,[1] is a fact of no moment, as the pigmentation is plainly secondary.

The complete destruction of the function of that portion of the retina that remains attached cannot have been pro-

[1] The simple form of retinitis pigmentosa, also retinitis pigmentosa due to syphilis, confined to one eye, has been observed (Baumeister, Pedraglia).

duced by rupture of the choroid alone; possibly it was brought about by the occurrence of a chronic choroiditis or partial atrophy of the optic nerve as a result of the ruptures. The loss of vision in the attached portion of the retina may have been caused by the presence of the lens in the posterior chamber, which produced a secondary glaucoma or a choroiditis. Retinitis pigmentosa as a result of glaucoma or choroiditis is of quite frequent occurrence (Leber in Gräfe-Sæmisch's *Handbuch*, Bd. v., p. 634). This also explains the atrophy of the choroid above mentioned.

Berlin (*Klin. Monatsbl.*, 1871, vol. ix., p. 278) has noticed, after section of the optic nerve, development of pigment in the retina originating in the pigment epithelium. This appears to explain the complete absence of pigment in the detached portion of the retina, as the pigment epithelium generally remains with the choroid, or, when detached with the retina, degenerates in a very short time.

Why only the detached portion retains perception of light remains unexplained.

# THE CILIO-RETINAL BLOOD-VESSELS.

By Dr. A. BIRNBACHER, Graz.

(FROM THE PATHOLOGICO-ANATOMICAL INSTITUTE, GRAZ UNIVERSITY.)

Translated by Dr. J. E. WEEKS, New York.

(*With fig. 3 of plate v. of vol. xv.*)

H. MÜLLER[1] and Nettleship[2] have found and described blood-vessels ramifying in the inner layer of the retina, which were not branches of the central vessels of the retina. Neither of these authors, however, could demonstrate the origin of these vessels, and the researches of Schnabel and Sachs[3] made it appear doubtful whether retinal branches were given off from the ciliary vessels.

The value of Nettleship's case is somewhat impaired by the fact that his sections were made from an eye in which papillitis had taken place, making it possible that the vessels described were newly formed and were the result of inflammatory action.

Fortunately, I am now prepared to demonstrate a specimen in which the existence of the so-called cilio-retinal vessels is proved beyond a doubt.

The specimen is from a perfectly healthy eye, and was obtained by horizontal section.

From a vessel 52 $\mu$ in diameter, lying in the choroid near the optic foramen, which, from the amount of muscular and elastic tissue that its walls contain, I judge to be an artery, a branch is given off. After passing toward the papilla for a short distance, this branch bends over the border of the choroid, enters the superficial portion of the

nerve-fibre layer of the retina, and runs toward the macula. Its medium diameter is 40 $\mu$.

The fact that arterial branches which originate from the ciliary vascular system ramify in the nerve-fibre layer of the retina and supply nourishment to portions of the layer, is demonstrated by this specimen.

As the diameter of the arteria centralis retinæ is 120 $\mu$., the cilio-retinal vessels, in this case, correspond to its branches of the second class. They are, of course, plainly visible with the ophthalmoscope.

The statement of Schnabel and Sachs that, considering the development of the eye, the existence of cilio-retinal vessels is in the highest degree improbable, I consider refuted. In proof of their existence I may mention the researches of Leber,[4] who has described small communicating arterial branches between the choroidal and retinal vessels where the retina encircles the papilla, the existence of which is admitted by Schnabel and Sachs.

It appears rational to believe that, if in the normal eye small vessels are developed in exceptional cases, larger ones may be found without in any way affecting the development of the eye or being in the highest degree improbable. Further, as references to fig. 3 will show, it is not necessary that the lamina vitrea should be pierced in order to permit of vascular communication between the vessels of the choroid and those of the retina. They may easily pass over the border of the lamina vitrea from choroid to retina.

Some time ago I had an opportunity to observe and describe a case where cilio-retinal vessels were present, in which embolism of the arteria centralis retinæ occurred.[5] The calibre of the cilio-retinal vessels remained the same after as before plugging of the central artery of the retinæ. They came from the temporal side of the papilla, and were undoubtedly branches from the ciliary vessels.

Schnabel and Sachs do not agree with me in regard to this case. They hold that after sudden closure of the lumen of the arteria centralis retinæ, hyperæmia of the ciliary vascular system occurs, and that on account of the ischæmia of the retinal vessels we may expect an over-filling of the

small communicating cilio-retinal vessels. Closure of the arteria centralis retinæ certainly produces hyperæmia of the vascular system of the choroid; but, when we consider the calibre and origin of the branches of the ophthalmic artery and the direction of the blood stream, we must admit that the degree of hyperæmia will be very low. The over-filling, which results from embolism of the arteria centralis retinæ, distributes itself throughout all the branches of the ophthalmic artery; hence, the choroidal vascular system can be but little affected. The combined diameters of the vessels of the uveal tract is relatively so great that it would be impossible with the ophthalmoscope to determine a change in the calibre of small branches of this system, produced by a slight increase in the amount of blood passing through the ciliary arteries. If these blood-vessels, however, are not cilio-retinal, but branches of the arteria centralis retinæ, given off behind the location of the embolus, the over-filling of these vessels would be much more marked, and the chances for determining an increase in their calibre with the ophthalmoscope much more favorable. The blood supply, which before was distributed throughout a large number of relatively large branches of the central artery, has, in this case, but two or three small branches to pass through. I must, therefore, hold my opinion, as stated above, to be correct, Schnabel and Sachs to the contrary, notwithstanding.

It is far from my intention to attempt to prove that all vessels which, with the ophthalmoscope, are seen to enter the retina at or near the border of the disc, originate from the ciliary vessels; only those can be known to be cilio-retinal which are not affected by embolism of the arteria centralis retinæ.

The cilio-retinal vessels are, as a rule, distributed in the portion of the retina lying between the papilla and the macula lutea, and thus preserve a very valuable amount of vision when embolism of the arteria centralis retinæ occurs.

[1] *Arch. f. Ophthal.*, vol. iv., part 2, p. 8.
[2] *Ophthal. Hosp. Rep.*, vol. ix., part 2, p. 162.
[3] These ARCHIVES, vol. xv., p.
[4] Graefe-Saemisch's *Handbuch*, vol. ii., p. 307; vol. v., part 2, p. 547.
[5] *Centralbl. f. prakt. Augenheilk.*, July-August, 1883.

# NOTE OF A CASE OF INTRAOCULAR HEMORRHAGE CAUSED BY A FALL ON THE OCCIPUT.

By A. SCHAPRINGER, M.D., New York.

On October 24, 1886, I was called to see Mrs. K., a patient of Dr. Edward J. Messemer, in order to examine her eyes. She was thirty-seven years old, of feeble build, and was the mother of thirteen children. The day before, while engaged in some household work, she had a fainting fit and fell backward, her occiput striking the floor with a loud thud. During the efforts made by frightened members of her family to revive her a quantity of spirits of hartshorn was spilled over her face. When I saw her the next day, her face bore the evidence of this mishap. The lids of both eyes were swollen and tender, and the conjunctivæ hyperæmic. The right eye was otherwise normal, both as to function and appearance. The left eye, besides an intensely congested ocular conjunctiva, showed the following abnormal appearances: While the cornea was perfectly clear, the aqueous humor was somewhat hazy. The pupil was dilated, oblong, the larger diameter being in the vertical direction, slightly irregular, and immovable. A small amount of blood was seen at the bottom of the anterior chamber. No lesion or continuity could be made out anywhere in the iris. With the aid of the ophthalmoscope and a tallow-candle, the only means of illumination at command, a uniformly red reflex could be obtained from all parts of the fundus, but no details could be made out. The patient could count fingers with this eye only to a distance of five or six feet. The motility of the globe was not impaired. The lens was perfectly normal in every respect.

The woman was soon afterward transferred to a hospital, and I have had no further chance to see her.

The only explanation for the hemorrhage, which had taken place in the left eyeball of this patient, can be found in the severe concussion of the skull which she had suffered, to which cause the paralysis of the sphincter pupillæ muscle has to be ascribed also. I could not make out the exact location of the ruptured blood-vessel, but as the amount of extravasated blood was very small, the vessel must have been a very minute one, for which reason its location could never have been determined.

As far as I have examined the literature of this subject I have not found the record of a single case of a similar nature. It seems possible that cases of intraocular hemorrhage from concussion of the skull escape notice on account of the severe brain symptoms which are usually present, and which fully occupy the attention of the physician. If the hemorrhage be slight, as it was in the case here recorded, it is apt to disappear in a very short time without leaving a trace.

# A NEW INSTRUMENT FOR PERFORMING OPTICO-CILIARY NEUROTOMY.

By WM. ELLERY BRIGGS, Sacramento, Cal.

SINCE 1879, when Schoeler first advocated section of the optic and ciliary nerves as a substitute for enucleation, many and conflicting opinions have been expressed as to the value of the operation and the permanency of its results. Its place in ophthalmic surgery is still unsettled. It has been abandoned by some authorities as unworthy of further trial, while others as eminent continue to express their conviction of its utility in properly selected cases.

The gravest objection that has been urged against the operation is reunion of the divided nerves and, consequently, re-establishment of those conditions for which it had been undertaken. To obviate this, some surgeons cut the internal rectus, or, following the practice of Meyer, divide the internal and external recti and both obliqui, which permits the eye being rotated sufficiently that a section of the nerves from four to six millimetres in length can be removed.

The fact that extensive operative procedure still further impairs the nutrition of the diseased organ, and the strabismus left after dividing the rectus muscle increases the deformity, first led me to devise an instrument by which the results of Meyer's operation could be attained without its disadvantages.

The apparatus, which was briefly noticed in my report on ophthalmology to the State Society (Trans. Med. Soc.

State of Cal., 1881 and 1882, page 150), was made by Messrs. Shepard and Dudley, of New York. It consists of two pair of curved scissors, united in such a manner that their cutting edges are from three to four millimetres apart, while their points are closely approximated. When closed in operating, the divided section of the nerves is pressed between the blades and withdrawn with them. The scissors work so that the two sections are made simultaneously. The steps of the operation are very simple. Under the influence of an anæsthetic (either general or local), I divide

the conjunctiva and subconjunctival tissue, and introduce the instrument, with the blades closed, between the internal and inferior recti muscles. The optic nerve will be found, and the remainder of the operation performed, precisely in the same manner as it is divided in the process of enucleation.

I have now used it in three cases, and in two which I have been able to trace there has so far been no recurrence of pain. I shall be glad to give any correspondent other details or information in regard to the instrument.

# IS THE POSITION OF REST THE CAUSE OF STRABISMUS?

By Dr. EDWIN J. GARDINER, of Chicago, Ill.

IN Vol. XV., No. 3 of these ARCHIVES Prof. J. Stilling, of Strasburg, published an article entitled "On the Origin of Strabismus," in which he asserts, that "the cause of squint is not hypermetropia, but the position of rest usually associated with hypermetropia, viz., convergence." Not believing this assertion to be correct, and being convinced that the discussion of these important questions is one of the avenues by which truth is reached, I propose to state as concisely as possible my reasons for differing with the author of the article.

In order to discuss the matter intelligently it is necessary first to state the conclusions which led to the formation of the theory, and then proceed to discuss the theory itself. To the experiments which led to his conclusions Dr. Stilling has evidently given abundant time and much thought, and he is certainly well repaid for his trouble, for this part of the article is pregnant with information of a most interesting and valuable nature. He started out to ascertain the direction which the visual axes assume when the eyes are at rest; and from this starting-point he has travelled over the whole field, making every anomaly of refraction and of muscular dynamics yield its quota to the interesting display of information presented in the article. These are the author's conclusions:

1st. "In the position of rest most eyes are convergent, many divergent, a few only are parallel."

2d. "In each form of refraction every variety of the

position of rest may occur. In a great majority of cases of hypermetropia the position of rest is convergence, whilst in myopia it is divergence."

The author next considers the relations of the position of rest to adduction and abduction. Having ascertained by experiment how much the distal adduction and abduction in normal eyes amounts to, he cites several very interesting cases which illustrate his third conclusion, viz.:

3d. "The relations of the values of abduction and adduction to the position of rest of ametropic eyes are by no means constant."

It is then stated that, "Among the factors to be taken into consideration as influential in determining the position of rest (besides refraction and the muscular condition), and which have not yet been made the object of study, are the shape of the orbital cavity, the topographical relations of the fibrous structures and the other soft parts surrounding the globe, the position of entrance of the optic nerve, and perhaps the angle $\alpha$. In emmetropia as well as in hyperopia these factors probably favor convergence as a position of rest, whilst in myopia the opposite is likely to prove to be the case." Using these conclusions as a basis Dr. Stilling proceeds to explain the production of squint. He says: "Normal vision is a continual struggle of the ocular muscles for binocular fixation against natural obstacles. If for one reason or another one eye becomes unable to keep up this struggle, or if it becomes impossible for both eyes to continue it in unison, then either one eyeball or both alternately will pass into the natural position of rest. Abolition of binocular vision may be due to many causes, and may originate either in the muscles or in the eyeball itself. In the majority of cases they originate in the eyeball itself, and are well known to us. I allude to differences of refraction and to the different varieties of amblyopia."

With regard to the squint found associated with amblyopia acquisita (in adults), it would be well to bear in mind that it is usually of the divergent form, and in these cases I believe that the refraction (with the exception perhaps of a few cases of hypermetropia) plays but a secondary rôle, and

that the divergent squint is the result of the operation of a general biological law, which predicates that when an organ is not used its functions are gradually lost. If one eye has become blind from one cause or another, the struggle for binocular vision ceases. When the good eye is directed to an object where convergence is necessary, the blind eye simultaneously converges, by force of habit, and in obedience to identical nerve stimulation; but as the object is not seen, the convergence of this eye becomes unnecessary, and gradually it becomes unsteady, then lags behind, and passes into a relative divergent strabismus, which may or may not become absolute. Of course if there existed a degree of hypermetropia which calls on an extra degree of convergence to increase the accommodation, the eye will turn in, for such a condition of things is the most favorable to the production of strabismus convergens—but we are here dealing with amblyopia acquisita regardless of the refractive condition, and these cases are certainly not corroborative of Dr. Stilling's conclusion No. 1, for in this case the most common variety of squint would be the convergent form, and experience I believe teaches that the opposite is the general rule.

The author then proceeds to explain the production of squint in hypermetropic eyes, in which one eye is affected with congenital amblyopia, or in which the difference of refraction is so great that one eye is incapable of binocular fixation. Then "The laws of relative accommodation will become inoperative, and the eyeball instead of assuming a convergent position will pass into its individual position of rest. If this position is a marked convergence, convergent strabismus will ensue. If it be slight convergence only, the consequence will be relative divergent strabismus, either permanently or only temporarily, changing later on into absolute convergent squint by reason of secondary atrophy of the relaxed external rectus and contracture of the internal muscle. . . . In such cases the matter is clear and simple."

That the condition of things mentioned in this paragraph, viz., hypermetropia combined with an amblyopic eye, or an

eye so hypermetropic that distinct vision with it is not attainable, is most favorable for the production of convergent squint, is very clear, but the process by which the author claims it is produced is not at all clear to my mind. In fact, it seems to the writer that a very important fact is overlooked in this paragraph, viz., that in hypermetropic eyes, even when one is amblyopic or so hypermetropic that with the highest tension of accommodation distinct retinal images are not possible, and consequently the laws of relative accommodation become inoperative, the relation of accommodation to convergence is not abolished. The laws of relative accommodation simply deal with the fact that, with a given convergence of the visual axis, the accommodation may be increased or relaxed, but these laws recognize as their fundamental basis the constant interdependence of accommodation and convergence. The manner in which convergent squint is produced, under such favorable circumstances, is too well known to need an exposition in this place, and, besides, Prof. Stilling adopts the same explanation up to the point where the eye turns in to excess, then, it is claimed, the eye assumes its position of rest; and here the author deviates from the generally accepted theory, which holds that the one eye, by excessive convergence, *actively* aids the other to attain and to maintain a tension of accommodation much higher than what its angle of convergence would warrant. To prove this statement, it will suffice to cover one eye of a hypermetrope of 2 or 3 D. While he fixes a distant object, the covered eye will deviate inward, not indeed because it assumes its position of rest, but because the accommodation operating to the extent of 2 or 3 D calls for a convergence of 2 or 3 AM. This deviation did not take place before one eye was covered, because of the inherent desire for binocular fixation, and a consequent shifting of the relative range of convergence; but when binocular vision is rendered impossible by excluding one eye, the convergence will immediately balance with the accommodation. If the object is brought toward the "near point," the covered eye will exhibit a relative increase of convergence, and very fre-

quently it will assume an unnecessarily strong convergence, in order to facilitate still more the accommodation of the other eye. That the "position of rest" is not the cause of these phenomena, is obvious from the fact that emmetropic and even myopic eyes (of moderate degree), whose visual axes are parallel or slightly divergent, if rendered artificially hypermetropic with concave glasses, and experimented upon in the above-mentioned manner, will exhibit, as a rule, the same phenomena.

The production of strabismus, where both eyes are evenly or only moderately hypermetropic, is finally taken up. In this, as in the former case, the well-known theory of Donders is used to account for the phenomena up to the point, where the hyperope, by sacrificing binocular vision, emancipates himself from the laws of relative accommodation. And, says Dr. Stilling, "therefore one of the eyes or both alternately pass into a position of repose. By sacrificing binocular vision the hypermetrope emancipates himself from the laws of relative accommodation, the positive part of which has become too small, his absolute accommodation becomes free for monocular vision, and asthenopia disappears partly or entirely."

The same line of argument is applicable to this explanation. The pertinent question is whether, after the eye has deviated, it has assumed its position of rest. I believe not, and for these reasons: If the absolute near point is found for an eye, either hypermetropic or emmetropic, by placing an object in the median line while the other eye is covered, we will find, on inspection of the excluded eye, that it is squinting inward, thus assisting the uncovered eye in its accommodation by excessive convergence, not by assuming its position of rest; for, were this the case in eyes whose position of rest is parallelism, this condition of things would not take place, and it can be proved by experiment that it does. In a case of convergent strabismus—notoriously in the periodic stage, but also when the strabismus has become constant—the approximation of the fixed object produces an increased deviation of the squinting eye. Now, if the squint is produced by the eyes assuming a position of

repose, we will have to admit a number of degrees of repose, and inasmuch as the deviation increases, as the accommodation and convergence of the other eye are brought more into play, we will be obliged to infer that the deviating eye rested the harder the more the other eye had to work. But the question may be asked: Why, if this be not the position of rest, should the patient seek it? Prof. Donders has answered this question most satisfactorily. In the first place, by turning the eye inward, the unpleasant double images are disposed of, and this extra convergence is a help to the other eye in its accommodation. The relative accommodation is done away with, but the correlation between accommodation and convergence is not abolished by strabismus. Again, it is quite notorious that in some cases of established strabismus convergens, even where one eye has become quite amblyopic, the continued use of atropine and of properly fitted glasses will produce a marked amelioration in the condition, and at times bring the eyes to their normal position. Now, if the eye is in a position of repose, what inducement would there be for it to return to its normal position? But, on the other hand, if we remember the interdependence of convergence and accommodation, we readily understand why paralyzing the accommodation, rendering distant vision possible by suitable glasses, we have removed the *cause* of the squint, and therefore (if the shortening of the internus has not become organic) nature, relieved of her burden, once more struggles for that which is normal. The relation between cause and effect in all these cases is so clear, that all room for doubt, or for other than this theory, is excluded; and therefore I cannot admit with Prof. Stilling that "the cause of squint is not hypermetropia, but the position of rest usually associated with hypermetropia, viz., convergence."

The constant association claimed for the convergent position of rest with hypermetropia, would naturally lead us to infer that the convergence is caused by the hypermetropic formation of the eyeball; and on this account the position of rest should certainly be taken into consideration, not as the cause of strabismus, but as one of the circum-

stances which co-operate in the production of convergent squint in hypermetropic eyes. More investigations are necessary, however, before this association can be set down as a constant thing. Personally, I have not yet been able to prove it, but my experiments are not sufficient to bear evidence in one way or the other.

Among the circumstances which co-operate to produce strabismus convergens in hypermetropia there is one which the author dismisses too soon. I refer to the angle $\alpha$. Prof. Donders attaches considerable importance to the magnitude of this angle in the production of strabismus, and, although it has recently been judged as a rather doubtful element by Landolt, I believe that the facts show that the eminent physiologist is right in his assertion. Landolt's objection is that the size of this angle is not in sufficiently constant relation with the degree of strabismus. Donders claims that with equal degrees of H, high values of the angle $\alpha$ especially predispose to strabismus convergens. And although the differences shown by Donders' two tables are very small, they are constant.

In the discussion of the vexed question, why all hypermetropes do not squint, Dr. Stilling ingeniously weaves in his theory of the position of rest. And here he obtains an advantage which before he could not enjoy, because his theory has no strong enemy in the field to overcome. We know why some hypermetropes squint, but we do not know why certain hypermetropes do *not* squint. That this question is very unsettled in the minds of ophthalmologists is obvious from the great number of theories which are found in the text-books on this subject. And the truth might as well be confessed that, in the present state of our knowledge, the reasons why certain hypermetropes do not develop convergent strabismus are unknown to us.

Not admitting the position of rest as a cause of strabismus, it goes without saying that Dr. Stilling's reasons, with the exception of the 6th (*vide*, p. 278), are unsatisfactory.

The most satisfactory explanation I know of is this: that given the disturbed relations of accommodation to convergence in hypermetropic eyes it is necessary for the pa-

tient to learn the art of disassociating his convergence from his accommodation, and to shift his convergence back into the negative field. He who cannot learn to do this or is incapacitated from so doing by a very limited positive range of relative accommodation, will develop strabismus convergens. The majority come by this art naturally, emerging from the struggle with binocular fixation, and hence, that all hypermetropes are not squinters. This theory, of course, applies only to hypermetropes of moderate degrees, for those who have but a slight H have no inducement to squint, while those who are affected with very high degrees of H gain nothing by squinting.

In view of the fact that there is nothing new in this article, that no new theories are advanced, and that the arguments used are all well known to the profession, it may occur to some that the paper had better been left unwritten. I argue, however, otherwise. For in the legitimate struggle for the acquisition of knowledge, man oftentimes follows blindly the creations of his own mind, and is led from the path which leads to truth. And I believe that it is the duty of his professional brethren to raise their voices in protest when, in their opinion, such a departure has been made, and, by discussing the question, to ascertain whether truth is on the side of the new theory, or whether the "old way is the better." That the opinion of one man is, other things being equal, as good as that of another is unquestionable, and were the views expressed in this article the result of my individual investigations and thoughts alone, I would not have presumed to assert that Prof. Stilling had departed from the safe road, but they are the views held by the majority of the most distinguished men in our profession ; they account, furthermore, in a most satisfactory and scientific manner for all the phenomena that present themselves for our consideration. And hence this paper, for I firmly believe that "the old way is the better."

# TRANSPLANTATION OF A RABBIT'S EYE INTO THE HUMAN ORBIT.

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IN the *Medical Record* of May 29, 1886, I reported a series of experiments, consisting of the transplantation of the eyes of rabbits. Previous to an account of the operation upon the human being, it may be of interest to give an abstract of the contents of the paper just alluded to:

Twenty-four rabbits were used in the experiments; in eighteen of these, the cornea either sloughed or became sclerosed and shrivelled so that the operation was considered a failure. In six, however, very favorable results were obtained. The failures in the first eighteen cases were attributed to imperfect technique and inability to keep the eyes properly bandaged. In the six successful cases, these difficulties were overcome, and gratifying results ensued; the transplanted organs became attached and preserved their vitality. Blood-vessels could be seen to pass from the orbital conjunctiva to the transplanted globe as early as the fifth day; muscles seemed to form some attachment as early as the third or fourth day. The favorable cases were watched for ten weeks, and at the end of that time the following had taken place: The transplanted organ had preserved its shape and consistence, though it had become a trifle smaller; vascularity was good; muscular action in all directions perfect; the cornea, which immediately after the operations had become opaque, had cleared consid-

erably, so that, although still hazy, the iris was distinctly visible. In all the cases there was neither implication of the healthy eye in any way, nor interference with the general health of the animals, so far as could be ascertained by the temperature and other means.

These favorable results upon rabbits' eyes led me to believe the operation a feasible one in man, notwithstanding that five cases had been reported, all of which were failures. The first case was that of M. Chibret (*Revue Générale d'Ophthalmologie*, May 31, 1885); the second that of M. Terrier; the third that of M. Rohmer; the fourth that of Dr. H. W. Bradford (*Boston Medical and Surgical Journal*, September 17, 1885)—I classify this case as among the failures, notwithstanding that it is reported as a success after eighteen days' observation, since this is the general belief among ophthalmologists, and since no answer was obtained to the writer's letter to the gentleman asking for further information about his case; also because the statement in the writer's report of these experiments doubting the success of Dr. Bradford's case has never been challenged. The fifth case is reported by M. Terrier, October 19, 1885. The results, therefore, were not promising as far as the transplantation of the eyes of rabbits into the orbit of the human being was concerned; my hope of being more successful than previous operators was based upon perfected technique and extensive experience with the operation upon the twenty-four cases alluded to. It seemed reasonable to infer, that if success had attended the last six of the series of experiments in rabbits, in whom the transplanted organ could not be kept absolutely quiet, and who were difficult subjects in other ways, that at least equally favorable results could be hoped for in man, where the patient would himself aid in the chances of the procedure by absolute rest to the organ, cleanliness, and local applications of heat and moisture to facilitate and hasten the process of union between the attached surfaces.

Not long after I received a communication from Mr. W., the editor of a prominent Western paper, in which he inquired whether I would be willing to perform the operation

upon him; he had lost the sight in one eye, and had been advised to have it removed so as to avoid implication of the fellow; he described himself as of good physique, of good habits, indulging considerably in athletic sports, and as being desirous of having the experiment tried upon him without any other promise as to results than that even though the experiment failed there would still be sufficient tissue remaining to form a serviceable stump for an artificial eye. This assurance I gave him, and, coming on to New York, he furnished the basis for the following report:

Mr. C. A. W., æt. twenty-nine. Seventeen years ago right eye was injured by an explosion on the 4th of July, a piece of metal perforating the upper lid and injuring the eyeball, but not lodging in it; severe inflammation followed for four weeks, then subsided, leaving the eye completely blind. The blind eye has never troubled him; the sound eye, after wearing a glass which corrected his astigmatism, never gave him much trouble. He wishes the right eye removed because it is unsightly, and because oculists at his home have told him it ought to be removed on account of a possible future effect upon the sound eye.

Present condition:

O. S. V. $\frac{20}{20}$: Hypermetropic astigmatism corrected by $\frac{1}{40}$s $\frac{1}{60}$ cyl. ax. 90°. Ophthalmoscopic examination negative. No ciliary tenderness. Lids normal. Conjunctiva normal.

O. D.: No perception of light. Cornea thinned, opaque, and staphalomatous. No ciliary tenderness. T. + 1. Eyeball slightly smaller than fellow. Conjunctiva normal. Upper lid presents double scar. Movement of eyeball good.

Operation Feb. 1, 1887.

A very large-sized brown buck of the kind known as the Belgian hare, having brown eyes (matching as nearly as possible, though a shade darker than those of the patient), was etherized; the conjunctiva separated at one eighth of an inch from the margin of the cornea all around, and the muscles and sub-conjunctival tissue severed, leaving as much areolar tissue upon the eyeball as was possible; the optic nerve was not divided at this stage, but the eyeball was covered by the lids and attention now directed to the patient. The latter having been anæsthetized in the meanwhile, the conjunctiva was separated from the globe as

close to the cornea as possible, a loop of thread was passed through each of the recti muscles with the overlying conjunctiva, and after these muscles had been thus secured, they were cut; the areolar tissue was loosened, keeping as close to the eyeball as possible, so as to leave as much tissue in the sac as could be left; the optic nerve was cut off close to the globe. The stump of the nerve was sought for with the finger, felt, and a single thread of fine catgut passed through it with a needle and forceps specially designed for the operation. These forceps consist of ordinary fixation forceps, with their lower extremity widened and curved, concavity inward, so that when the ends are approximated they represent a circle, the diameter of which is 3½ *mm*, and the edges were slightly rough; the sides of the lower expanded extremity present small openings. The special needle consists of a lance-shaped, pointed, curved needle, the eye being situated very near the point, mounted upon a handle.

The optic nerve having been seized with the forceps, the needle, threaded with fine catgut, was passed through the lateral openings of the forceps and thus through the optic nerve; the suture was caught up from the end of the needle after having traversed the nerve, the needle withdrawn, and the forceps removed; in this way the suture had been passed through the end of the optic nerve with a minimum amount of laceration and without loss of time. Attention was now given to the rabbit's eye, the enucleation of which was completed by cutting the optic nerve, dividing it as far back as was possible, and leaving upon the globe as much areolar tissue as was present.

The suture through the patient's stump was now passed through the optic nerve remaining upon the rabbit's eyeball, and the ends of the two optic nerves were thus approximated and secured by an ordinary knot. The conjunctival sac was then stitched to the rim of conjunctiva remaining upon the rabbit's eye, ten sutures being employed; those inserted opposite muscles included the anterior extremities of these and thus fastened them to the globe. During all this time, the rabbit's globe remained perfectly clear. During the operation saturated solution of boric acid was used freely upon the eye of the patient; no fluid of any kind was applied to the eye of the rabbit, previous experiments having led me to believe that the use of boric acid and of corrosive sublimate had hastened the clouding of the cornea. The eye being freed from blood, the lids were approximated, white vaseline and cot-

ton applied ; both eyes were bandaged, pressure upon the transplanted organ being avoided. Hot compresses were ordered ; these consisted of four-ply pieces of linen wrung out of hot water ; they were applied over the bandage, and supported upon a wire frame so arranged as to avoid pressing upon the eyeball, by resting upon the margins of the orbit.

Feb. 2d. Second day.—Eye felt slightly sore, but no great pain. Removed dressings at the end of twenty-four hours ; considerable chemosis and marked œdema of upper lid ; cornea smooth, nebulous, but iris distinctly visible ; cornea insensitive ; there was a moderate amount of sero-purulent discharge mixed with blood. Rebandaged both eyes, and hot applications continued day and night.

Feb. 3d. Third day.—Cornea more hazy, iris being almost indistinguishable ; considerable sero-purulent discharge.

Feb. 4th. Fourth day.—Œdema of upper eyelid and chemosis are still considerable ; conjunctiva is very much reddened and angry-looking. Cornea is almost opaque, so that iris can scarcely be distinguished ; it is smooth, has preserved its form, and is insensitive ; the movement of the transplanted organ is good (due to stitches) ; patient has remained quiet upon the back, urine and fæces being discharged in the recumbent posture ; he feels comfortable, and pulse, respiration, and temperature have remained normal ; both eyes are still kept bandaged, and the sound eye appears normal.

Feb. 5th. Fifth day.—Patient allowed to sit up an hour in bed. Less œdema of upper lid and less chemosis, though conjunctiva is still very much reddened, and at junction with the transplanted organ a number of small granulations are seen ; hot applications are now made for one hour every three hours.

Feb. 6th. Sixth day.—Discharges are sweet, moderate in amount, and sero-purulent in character ; some of the stitches were removed ; others still in place. Granulation tissue still visible.

Feb. 8th. Eighth day.—Everything had progressed favorably thus far. The cornea was smooth, insensitive, opaque ; movement of the eyeball excellent ; size the same as on insertion ; the sound eye and the general health of the patient had not suffered in the least. Upon removing the dressings to-day, the presence of pigment from the iris shows that an opening in anterior chamber must exist ; on examination, no opening can be found, but the lower part of the cornea looks suspicious at one point. Form of eyeball still preserved. Rebandaged.

Feb. 9th. Ninth day.—Upon removing dressings, more pigment of iris was found to have escaped. Examination shows a small ulceration at lower edge of cornea with perforation. The patient said the eye had felt "soft" during the night. Discharge moderate and sero-purulent. The experiment was considered at an end, for although patient was willing to submit to another transplantation, this was not considered justifiable.

The rabbit's eye was removed under cocaine anæsthesia and the operation was quite painful, notwithstanding the free use of the local anæsthetic. A few of the sutures were still in place; the steps of the secondary operation were those of an ordinary enucleation. The muscles were found to have become attached, but the connection was not very firm and could be severed with the hook; here and there the scissors had to be used; the optic nerve was found to have united by loose connective tissue and had to be cut again. After enucleation, the rabbit's eye was found to have preserved its form, was slightly smaller than on insertion, the cornea opaque, considerably thickened, and presenting the perforation already alluded to; lens opaque; vitreous of a boiled-starch appearance. The conjunctival sac was found to be lined by numerous collections of granulation tissue, and swollen and stiffened so that on withdrawing the eyeball the sac did not collapse, but presented the appearance of a hollow globe with a central deep cavity corresponding in size and form to the removed eyeball. The cavity was scraped and the margins of the sac approximated by sutures.

Feb. 21st.—Since last note there has been considerable discharge of a muco-purulent nature from the stump, and the hardness and swelling have gradually disappeared, so that now it presents the appearances of an ordinary stump several days after an enucleation, and is ready for an artificial eye; it is of good size and possesses excellent motility.

In reporting this case I do so with the hope that it may be regarded as a fair test-case; although it is true that one case does not prove much, yet this one is entitled to special consideration in this respect—the patient has had every possible chance of success. Of good physique, with good care and nursing, and with extraordinary patience, he made a capital subject for the experiment; then again I had flattered myself that the technique could not have been

much improved; I had sufficient experience with the operation both during the experiments upon rabbits and upon the cadaver, so that there was no hitch in the proceding; were I to do the operation over again I do not know how I could change or improve any of the details—and yet it was a failure! So that I have changed from an enthusiast to a disbeliever in the operation. I do not believe it a feasible one in man, and would not be willing to undertake it again. While smaller portions of tissue may be transplanted with success, the whole eyeball presents too great a mass to have its vitality preserved and make even a fair substitute for the artificial eye.

In conclusion, I wish to express my obligations to Dr. E. Gruening for valuable assistance and suggestions during the operation; it is a satisfaction to know that this gentleman agrees with me in the assertion that the case is entitled to be considered as of value as a good test-case, in which the operation had every possible chance of success, but yet failed.

# ON CATARACT EXTRACTION WITHOUT IRIDECTOMY.*

By H. KNAPP.

DAVIEL'S method of extraction—*i. e.*, the "simple method," without iridectomy, has of late been revived and recommended with particular emphasis by French oculists, Galezowski, De Wecker, Panas, and others. Thus far, it has found only a small number of advocates outside of France, yet what I saw of it in Paris last winter, impressed me so favorably that I determined to give the method a fair trial. In order to learn what was known and thought about it in this country, I brought it before the American Ophthalmological Society in July, 1886. At that time my experience with it comprised only six operations. Dr. H. D. Noyes reported on six others, and Dr. Grüning on two. Both gentlemen had witnessed the operation in Paris.

My present communication is based on twenty-nine successive cases—including the six mentioned above—in which I succeeded in extracting the lens without exsecting the iris, and on six cases in which I attempted to do so but did not succeed. Our French confrères have described the method in general and in detail. They claim that they have practised it in hundreds of cases, and that the results have been excellent, superior to Graefe's or any other method, but they have given us no detailed and conclusive statistics. Statistics have their fallacies, they are never entirely objective, always bearing more or less of a personal

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stamp, yet they give us a better insight into our own as well as another's work than we can obtain from general descriptions, which reflect only our impressions and opinions for the time being. When we think more or less favorably of a method, we are very apt to overlook, forget, or reason away what is adverse to it. Statistics, if we are honest to ourselves, hold up hard facts that often astonish us. I consider it a decided advantage that some of the larger ophthalmic institutions in this country, for instance, the N. Y. Eye and Ear Infirmary and the Massachusetts Charitable Eye and Ear Hospital, publish in their annual reports detailed statistics of that most important of eye operations, the extraction of cataract. From this point of view I have compiled in tabular form the twenty-nine cases of the operation under consideration, so that all may draw their own deductions therefrom. See table, page 56, etc.

I now beg leave to discuss the subject in its various practical bearings.

### 1.—Preparation of the Patient.

*No patient was operated on the day of entrance into the hospital.* They were all kept in the hospital one or more days, in order to have their eyes thoroughly clean and free from irritation. The eyes were washed with soap every morning and evening, and Panas' antiseptic (biniodide of mercury, 0.05; alcohol, 20.00; dist. water, 1000.00) was instilled several times daily.

Only one patient was operated in the new *operating-room* of the Institution, which was built in the closest possible adherence to bacteriological principles. From the operating room the patient, with bandaged eyes, was led up one flight of stairs. The next day I found he had extensive prolapse of the iris, although the pupil after the operation had been perfectly round and central. He was restless the first twenty-four hours. I do not know how far the moving of the patient was to blame for the prolapse, but I have operated on all others in their bedrooms, where an operating-chair and a drop-light were always on hand. In Paris I have seen that the patients are operated in operating-rooms,

| No. | Name. | Age. | Character of cataract. | Complication. | Date of operation. | Operation. | Reduction of iris. | Healing process. |
|---|---|---|---|---|---|---|---|---|
| 1 | M. Don. | 76 | Hard. | | June 10, '86. | Regular. | Spontaneous. | Plastic iritis. |
| 2 | A. Balf. | 36 | Soft. | Od. white. | 11 | " | " | |
| 3 | M. Cam. | 55 | Hard. | | 14 | " | " | |
| 4 | M. Cas. | 60 | " | | 21 | " | " | Plastic iritis. |
| 5 | C. Woods. | 63 | " | | 21 | " | " | " " |
| 6 | M. Bey. | 52 | " | | July 9 | " | With probe. | |
| 7 | J. Mar. | 65 | " Not quite ripe. | | 26 | " | Spont. | |
| 8 | E. Mull. | 52 | Hard. | | 27 | Small piece of cortex scooped out with spatula. | " | |
| 9 | O. Dem. | 40 | Hypermature. | | Aug. 13 | Regular. | " | |
| 10 | H. Alb. | 57 | Hyperm. | Dacryocystitis. | Sept. 20 | Considerable manipulation and introduction of instruments. Rigorous antisepsis. | Stroked back. | Striped keratitis. Pupil partially occluded by thickened capsule. |
| 11 | L. Scott. | 76 | Hyperm. black. | Myopia; liquid vitreous. | 22 | Thickened capsule removed with forceps. Lens expelled by rotating on horizontal axis. Lower edge escaped first. | Spontaneous. Pupil round. | Very restless patient, throwing himself spasmodically about in his bed at night. Had to be watched and tied. |
| 12 | Fr. Müll. | 61 | Hard. | | | Regular. | With probe. | |
| 13 | M. Wallace. | 70 | " | | Oct. 2 | " | " " | |
| 14 | Mrs. J. Pretorius. | 64 | Hyperm. | | 9 | Escape of vitreous after expulsion of lens. | " " | The folded iris left an irregular pupil. Healing good. |
| 15 | J. Duffy. | 63 | Hard. | | 9 | Regular. | Spont. | |
| 16 | Mrs. Jones. | 67 | " | | 19 | " | With spatula. | |
| 17 | Mrs. Mills. | 67 | Morgagnian cholesterinic. | F contracted below. | 27 | Nucleus rubbed out in pieces. The deaf and uncontrollable patient had to be etherized | To stroke the iris back. | Next days cotton moist, edges of wound white, ant. chamber cloudy, iris dull. Careful cleansing with Panas' solution. Gradual clearing up. |
| 18 | Kigg. | 70 | Hard. | Mac. corneæ and dacryocystit. chronic. | Nov. 1 | Regular. Pupil apparently clear. Panas' sol. injected in ant. chamb. | Spont. | From pupillary area a shred of capsule passed over iris to nasal corner of wound. Closure of wound normal; pupil round; but pain and circumcorneal injection and swelling, and cloudiness of pupil for a long time. The shred of capsule shrank from periphery and finally disappeared. |
| 19 | Sauter. | 64 | Hard. | | 13 | Regular. | Spont. | |
| 20 | Murr. | 40 | Semimollis. | | Nov. 13 | Regular. | Spont. | |
| 21 | McLaughl. | 40 | Traumatic. | Small foreign body in eye. | 16 | Cortex left. | " | |

| Iris prolapse or incarceration. | Post. synech. | Length of treatment in days. | Primary result. | After operation. | Ultimate result. | Remarks. |
|---|---|---|---|---|---|---|
| | Numerous. | 23 | $\frac{10}{200}$ | | $\frac{20}{70}$ (eight mos.) | |
| | | 16 | $\frac{15}{200}$ | | $\frac{8}{200}$ | Atrophy of od five years. Other eye less, but S $\frac{15}{200}$ only. |
| | | 21 | $\frac{20}{100}$ | | $\frac{20}{30}$ six mos. | |
| | Moderate. | 17 | $\frac{20}{100}$ | | | |
| | " | 25 | $\frac{20}{100}$ | | $\frac{20}{30}$ eight mos. | Pupil partially obstructed by capsule. Fundus distinct. |
| | | 14 | $\frac{20}{70}$ | | $\frac{20}{30}$ | Pupil round, free, partially obstructed by capsule. |
| | | 12 | $\frac{20}{200}$ | Discission five weeks later. | $\frac{20}{70}$ | |
| | Three filiform. | 16 | $\frac{20}{100}$ | | $\frac{20}{30}$ eight mos. (not fluently.) | Od surrounded by atrophic band on nasal side. |
| | | 13 | $\frac{20}{70}$ | | | Isinglass plaster applied on fourth day. Preferred old bandage. |
| Iris extensively incarcerated. Pupil drawn up, round. | Numerous. | 28 | $\frac{20}{100}$ | Discission four months later. | $\frac{20}{30}$ | Old dacryocystitis discharging muco-pus, from which a good cultivation of staphylococcus pyogenes aureus was obtained |
| Prolapse of iris from second day. Slow but good closure of wound. | | 35 | $\frac{20}{100}$ | | | Prolapse permanent, but free from irritation. Eyes greatly sunken in orbits. |
| | Two or three filiform adhesions. | 14 | $\frac{20}{200}$ | | | |
| | Three filiform adhesions. | 22 | $\frac{20}{70}$ | | | |
| No incarceration. | | 27 | $\frac{20}{200}$ | | $\frac{20}{100}$ four mos. | Unmanageable patient. Pupil and fundus clear; astigmatism. Pupil eccentric; no prolapse. |
| | | 23 | $\frac{20}{100}$ | Discission seven weeks later. | $\frac{20}{30}$ | |
| | | 17 | $\frac{20}{70}$ | | | |
| Prolapse from second day; disappearing later, leaving eccentric pupil. | Numerous. | 26 | $\frac{5}{180}$ | | $\frac{10}{200}$ | In secretion at edge of wound micrococci and bacilli found under microscope; grew and liquefied gelatine like staphylococc. pyogenes. |
| | | 33 | $\frac{5}{200}$ | | | Capsule occluding pupil; has to be split. |
| | Two small, on inner side. | 15 | $\frac{20}{200}$ | Disc. in five weeks. | $\frac{20}{30}$ | |
| | Some, filiform. | 14 | $\frac{20}{100}$ | Disc. in ten weeks. | $\frac{20}{30}$ | |
| | Some, from injury. | 23 | $\frac{10}{200}$ | | $\frac{20}{30}$ in ten weeks. | |

| No. | Name. | Age. | Cataract. | Complication. | Date of operation. | Operation. | Reduction of Iris. | Healing process. |
|---|---|---|---|---|---|---|---|---|
| 22 | Schuhman. | 65 | Hard. | Dacryocystit. chronic. | 18 | Regular and very smooth and quick. | With spatula. | Two days without irritation. Wound united, clean; clear and central pupil. Patient restless, got up. Pain in third night. Infiltration of wound; panophthalmitis. |
| 23 | Schultz. | 65 | " | | Dec. 22 | | With probe. | Patient restless the first day, pain in eye; pupil oval. |
| 24 | Pahud. | 63 | " | | 22 | Patient pressed inordinately. A few drops of vitr. followed lens. Iris folded at periphery. | Stroked back only partially | Well the first three days. Then extensive traumatic hemorrhage by rubbing with hands, repeated three or four times in the course of two weeks in spite of all precaution. |
| 25 | Mrs. Smith. | 35 | Soft. | Diabetes. | Jan. 5, 1887 | Regular. | With probe. | |
| 26 | H. Walt. | 62 | Hard. | | 12 | " | Spont. | |
| 27 | C. Schlette. | 60 | " | | 17 | Regular. Some flakes remained in pupillary area. | With probe. | No irritation. |
| 28 | McArth. | 55 | " | Dacryocystit. simplex. | 22 | Regular. | Spont. | |
| 29 | Harris. | 33 | Morgagn. | | 30 | Nucleus expelled by rotating lower end up. | Spont. | Wounds open at bandaging for days. Iritis. |

thence carried into the wards on a litter (Panas), or walked up stairs (DeWecker), or brought up in an elevator (Fieuzal). An operating-room which is used for nothing else and kept dust-free is, of course, preferable to a sick-room. Yet, when there are no other or only a few patients in a room, the air can be kept virtually free from pyogenic germs. It is now well known that infection from the air is the least to be dreaded. Of all the pathogenic germs, the pyogenic seem, however, to be the most extensively distributed in the air, at least they are the only pathogenic ones that have, thus far, been directly obtained in cultivations from the air.

The patients commonly received a bath the day before the operation, and their heads were washed with soap. When they were seated in the operating-chair, the eyes and surrounding parts were washed with soap, wiped dry,

| Iris prolapse or incarceration. | Synechiæ. | Length of treatment. | Primary result. | After operation. | Final result. | Remarks. |
|---|---|---|---|---|---|---|
| Iris prolapsed on fourth day when wound had opened. | | 26 | 0 | | | The dacryocystit. had been treated for four months, and seemed sufficiently improved to venture operation. |
| Iris incarcerated, not prolapsed. | No synechiæ. Pupil oval. | 29 | $\frac{20}{100}$ | | $\frac{20}{100}$ two months. | Marked astigm. |
| Upper part of iris drawn back. | Pupil irregular. No synechiæ. | 38 | $\frac{15}{100}$ | | | Patient uncontrollable. |
| | | 15 | $\frac{20}{70}$ | | | |
| | | 11 | $\frac{20}{70}$ | | $\frac{20}{15}$ | |
| On second day prolapse of iris along the whole wound, covered with the conjunctival flap. Prolapse gradually disappeared leaving the whole wound free. Pupil oblong. Sphincter in eye. | No synechiæ. | 17 | $\frac{20}{100}$ | | in four weeks. | |
| | Small synechiæ above and below. | | $\frac{20}{70}$ | Disc. on eighteenth day. | $\frac{20}{15}$ $\frac{20}{15}$ | |

and then washed with corrosive sublimate $\frac{1}{2000}$, or Panas' solution of biniodide and alcohol, or carbolic acid $\frac{1}{60}$. Then Panas' solution was freely instilled into the conjunctival sac and over the cornea; the upper lid was turned, and its conjunctival surface (more particularly its free edge) carefully washed with absorbent cotton moistened with the biniodide solution.

A drop or two of a three-per-cent. or four-per-cent. solution of *muriate of cocaine* was now let fall on the cornea, followed by another drop or two six or seven minutes later. Then the biniodide was again instilled, and the operation begun. Ether was given in several cases; not in as many as might have been desired.

The instruments, of course, *had been previously cleansed and sterilized.* They were washed with soap, boiled water, and the

alcoholic solution of biniodide of mercury. For instruments with uneven surfaces—forceps and the like—a soap-brush was used; the others were rubbed with freshly washed linen. All were wiped dry, polished with the same kind of linen, and dipped in the biniodide solution immediately before being used, the liquid being left on them. Special care was taken in cleansing the cystitome, on account of its angles, from which it is more difficult to remove germs than from a straight, polished surface.

The *hands of the operator* and of his assistants were cleansed in the usual way with soap and bichloride of mercury.

### 2.—Mode of Operating.

The lids were kept open with a *wire speculum* provided with a screw.

The eyeball was steadied with the ordinary *fixing forceps* implanted in the conjunctiva close to the lower corneal margin. A *Graefe's knife* was then, rather quickly, passed through the anterior chamber, making a section through two fifths of the transparent corneal margin, or less, according to the size of the cataract.

If the eye is completely free from irritation, I avoid a *conjunctival flap* as a useless complication; but when there is chronic conjunctivitis or dacryocystitis, I consider a conjunctival flap of advantage. No doubt it increases the danger from primary infection by enlarging the wound, yet with antiseptics we can efficiently guard against the primary infection, but not so well against the secondary, from which the conjunctival flap is a protection. These views are derived from the series of operations under consideration, and they will be spoken of further on. The iris is best avoided by passing the knife *quickly* through the anterior chamber. In none of the cases of the present series did the iris fall before the blade of the knife, nor was it wounded in any way.

As soon as the section is completed, a *cystitome is introduced* and the capsule opened extensively in the centre, the manœuvre being completed with a horizontal stroke in the upper part. If the iris is not prolapsed, the point of the

cystitome may in the last stroke be passed underneath its upper part. In several cases pieces of capsule were drawn out with the forceps.

The *lens* is *now expelled* by pressing with a rubber spoon on the lower part of the cornea, as in Graefe's method, or by pressing on the cornea with the lower lid after the speculum has been removed. The latter mode is preferable in complicated cataracts, especially when the suspensory ligament is defective and the lens dislocated. In some cases, in this as in Graefe's method, when I saw that the upper end of the cataract or its nucleus did not present in the wound, but wedged itself into the periphery of the posterior chamber, I pressed it toward the centre of the globe with one hand, while pressure upon the lower part of the cornea with the other moved the lower edge of the cataract up and into the wound. Simultaneous pressure with both hands towards the centre of the eyeball expelled the lens gently and without accident. I am sure that I am not the only one acquainted with this mode of exit, but since I have seen some such cases do surprisingly well, I have studied and adopted it as a method for a certain group or cases.

The *removal of remnants* of lens is most important. Panas lays the greatest stress on this step. He says "the perfection of the result and the absence of operative complications depend chiefly on good cleaning of the pupillary space. Pressure with the fingers, pressure with the curette (he uses Daviel's spoon), repeated introduction of instruments into the anterior chamber—we spare neither time nor trouble to attain our object, and we succeed." One must have seen Prof. Panas do this to believe what an amount of interference eyes are capable of enduring without injury. He says "the antiseptic method has here, as in lithotrity, changed every thing, and nothing need be feared, provided the washing out of the anterior chamber (*le lavage intra-oculaire*) is made (as he does it) regularly." [1] I have endeavored to follow Panas' example, and yet have been cautious with regard to scooping the remnants out. I have preferred to let patients

[1] Bulletin de l'Académie de Médecine, Séance du 5 Janvier, 1886.

wait until their cataracts are completely ripe in order to avoid extra trouble in the removal of remnants. When the pupil was clear, the eye was closed for a short time to let the iris resume its natural position. This occurred spontaneously in seventeen out of the twenty-nine cases (fifty-nine per cent.). In the others the iris was reduced by rubbing the cornea with the lids or stroking with a probe the folded iris out of the wound and the sinus of the anterior chamber back into its normal position. If, in spite of my efforts, the pupil was not central and round, I made an iridectomy on the spot.

Particles of lens, blood, etc., during the operation were wiped away with absorbent cotton dipped in the alcoholic solution of biniodide of mercury.

The last part of the operation was the *washing out of the anterior chamber*. After the speculum had been removed, the upper lid was held up with the forefinger of my left hand, the patient was directed to look downward, the nozzle of an E. Meyer's lachrymal syringe—which was used for no other purpose—was introduced into the wound, and a few drops of the biniodide solution thrown into the anterior chamber, the nozzle of the syringe passing along the section so as to moisten the wound with the antiseptic from one end to the other. I have avoided injecting large quantities of liquid into the eye, my object being to sterilize the region of the wound, not to kill germs nor to cleanse the pupil by the stream of liquid. When the operation had been quickly performed, and no instruments except the knife and cystitome introduced, I limited the injection to the lips of the wound, and in a few cases did not use the syringe at all, but dropped the antiseptic over the wound with an ordinary atropine dropper. There are no germs within the eye, and the few that may possibly be introduced with the instruments from the conjunctiva are not likely to multiply in an eye that has been operated on smoothly and cautiously. It is a different thing if the cornea and iris are bruised by the pressing of a large lens through an insufficient wound, and if the capsule has been indiscriminately lacerated, especially if particles of cataract and shreds of

iris and capsule remain in the section. These conditions prepare the soil for the multiplication of bacteria, and demand the use of efficient antiseptics. In such a case I would irrigate the conjunctival sac and syringe out the anterior chamber freely with the alcoholic biniodide or a watery bichloride (1 : 5000) solution.

When the operation was finished, I instilled two drops of a one-per-cent. solution of sulphate of eserine. Of late, I have also put a small quantity of eserine ointment (0.10 to 10.00 of vaseline) into the conjunctival sac. The closed eyelids were covered with a compress of linen gauze, which was smeared with an ointment consisting of 0.15 of benzoate of mercury to 10.00 of vaseline cold cream. A pad of absorbent cotton steeped in the biniodide solution was spread over the gauze, so as to form a mould over the eyelids; then dry absorbent cotton was placed on the wet cotton and on the lids of the other eye, both held in position by a flannel roller applied in the manner of the old binoculus bandage, which, in my opinion, still remains unexcelled.

### 3.—After-treatment.

The patients were *put to bed* with as little disturbance as possible, and requested to lie on their backs as quiet as they could. They sat up in bed while taking their meals, and got out of it to satisfy calls of nature. *Rest* is considered to be of the greatest importance, not only as favoring primary union in general, but more especially in this method of extraction, in order to prevent prolapse of iris. To darken the room is by no means necessary, and never has been, for the bandage is a sufficient protection from too bright a light.

The *next day* the dressing is renewed without opening the eye, except when there is inflammation. In most cases there is a small quantity of mucus on the gauze, probably conjunctival epithelium necrosed by the action of the antiseptic. If otherwise the gauze is dry, the new bandage is left undisturbed for two days. Then the eye is opened and inspected. If the pupil is round and central and no irritation present, the eye is cleansed and bandaged again without any instillations. If the pupil is oblong, eserine solution

is instilled, and eserine salve put in the conjunctival sac; if the pupil is round and central, the wound closed, but circumcorneal injection or some pain is present, atropine is instilled. I am inclined to use atropine earlier and more frequently than is recommended in the simple extraction. Wherever shreds of lacerated capsule come in contact with the pupillary edge of the iris, synechiæ are apt to develop. In the present series there were synechiæ in ten cases out of twenty-nine; in no case were they extensive, nor did they lead to the formation of a dense pupillary membrane, yet many of them might have been ruptured had I instilled atropia earlier.

Of the *accidents* occurring during the operation, two cases of escape of vitreous are to be noted (Nos. 14 and 24). In both a few drops followed the exit of the lens. The iris lay folded in the upper part of the anterior chamber, and it was impossible to reduce it either by rubbing or the probe. The wounds united well, without prolapse or incarceration.

### 4.—Wound Complications.

There were two cases of *incarceration of the iris* (Nos. 10 and 23).

The *first* was in an exceedingly nervous man with a hypermature cataract, the removal of which had been very laborious. The pupil, at the end of the operation, had been completely round. Two days later, when the eye was opened, a considerable portion of the iris lay in the wound without protruding. It was covered by a conjunctival flap. The anterior chamber was restored. There was plastic iritis, but no suppuration, though the patient suffered from chronic dacryocystitis. The wound closed completely, no iris was seen lying in the outer layer of the wound. Four months after the operation S $\frac{2}{10}$ was raised to $\frac{2}{10}$ by a discission.

The *second* case was the man spoken of previously as having been operated on in the operating-room, and led up one flight of stairs. He was restless for the first twenty four hours and had some pain in the eye, but when he lay quiet, after having been told that rest was of the greatest importance, the pain disappeared and the recovery henceforth was undisturbed. S $\frac{20}{100}$, two months after the operation, with marked astigmatism.

There were four cases of *prolapse of iris* occurring within the first three days after the operation.

In case No. 22 the iris was seen lying in the centre of the corneal wound, suppuration being fully developed.

In the case of puriform inflammation (No. 17) the iris was noticed in the centre of the section. It disappeared from view when the inflammation subsided. The pupil was drawn up, the whole sphincter being in the anterior chamber.

The third case referred to an old man, who in his sleep used to throw himself about in spasmodic fits. His was the only case in which the prolapse remained; the recovery being slow but free from inflammation, and the pupil perfectly clear, though drawn up.

In the fourth case (No 27) the iris protruded beyond the corneal wound in its whole extent, but was covered with a conjunctival flap. During the recovery, which was quick and undisturbed, the whole iris disappeared from the outer aspect of the wound. The pupil was oblong, the sphincter completely in the eye; no synechiæ.

In former times I was in the habit of abscising all traumatic prolapses of iris. Of late I have become more conservative with regard to this point. I noticed that prolapses left to themselves mostly disappeared or cicatrized in a surprisingly smooth manner, and it seemed to me that they gave rise to sympathetic trouble less often than when I had abscised them. If I get the cases early, before adhesions with the cornea have formed, I remove the prolapsed iris and stroke the rest back into the anterior chamber, *i. e.*, I make a clean iridectomy. Prolapses from ulcers or wounds that are suppurating I never cut. The iris is a barrier against the entrance of the germs into the interior of the eye, a fact which not only is clinically well known, but which I saw verified by experiments on rabbits in which the uncut iris showed itself very resistant to the action of pyogenic bacteria.

The *healing process* was, on the whole, satisfactory. The two cases of suppurative inflammation, of which the one ended in recovery, the other in loss of the eye, were owing to individual complications, not to the method.

*Posterior synechiæ* were left in ten cases, but they were not extensive.

More or less *pupillary obstruction* from the lens capsule required *discission* in six cases; in three others it has to be done now, and probably in some others later.

*Traumatic after-hemorrhage* (No. 24) occurred in a patient who, with the best will, could not control his hands during his sleep nor avoid hurting his eye against the bedding or the wall. He was a stout asthmatic man, who would throw himself about in spite of all precaution and restraint. The blood totally filled the anterior chamber and hung out of the wound in clots. The hemorrhage occurred in a less degree four other times. The blood was absorbed and left a good eye.

*Plastic capsulitis* with congestion of the iris and ciliary body occurred in one case (No. 18), which was rather remarkable. From the centre of the pupil a shred of capsule passed over the anterior surface of the iris to the inner corner of the wound. It kept up an irritation and I was tempted to open the wound and extract it with a pair of forceps, for I feared that it might be the carrier of infection, the patient suffering from chronic dacryocystitis. When the irritation set in the wound was already perfectly closed, and there seemed to be no longer any communication with the conjunctival sac, if indeed it had ever existed. Under atropine, leeches, and rest I noticed that the shred became smaller and finally disappeared. In the pupil there is now a somewhat dense capsule, which can be split with a knife-needle.

The case of *puriform kerato-iritis* (No. 17) presented a good deal of interest. The cataract was white, not gray. The field of vision was contracted in its lower part. Prognosis unfavorable, but, as the other eye had an immature cataract of the same nature, I advised an operation. When the capsule was opened milky cortex overflowed the anterior chamber. The nucleus came out in pieces. The pupil was clear and central after the iris had been stroked back. When the antiseptic was injected into the anterior chamber the patient made a sudden start, which was followed by prolapse of the iris, and she kept up such a constant motion of the eye that I was unable either to stroke the iris back or to cut it off. I therefore anæsthetized her with ether, reduced the iris, and injected the antiseptic. The pupil was clear, round,

and central. The next day the gauze was moist. On the fourth day the edges of the wound were whitish, the cornea hazy, the anterior chamber dull; a small portion of iris lay in the wound. By cleansing the wound and washing the conjunctival sac out three times daily the inflammation gradually subsided. The pupil was drawn up, but the wound was normal. No sloughing of the cornea, no retraction of the scar, no diminution of the size and tension of the globe had taken place. Sight has improved up to about $\frac{10}{200}$, and promises to be further improved by a discission.

I would say that the inflammation in this case had not been purulent, but lymphatic, had not cultivations from the wound secretion given us a well-characterized growth of staphylococcus pyogenes. Evidently, infection of the wound had taken place, but the inflammation was not intense enough to destroy the eye.

The case of *panophthalmitis* (No. 22) teaches a lesson which is not new. I treated the conjunctivitis and dacryocystitis for months, and did not operate till the discharge had ceased. Yet the conjunctiva was still red and somewhat swollen. Operation regular. Antiseptic precautions rigorous. No reaction for two days. Wound closed, clean; anterior chamber, iris, pupil, and sight normal. Then patient got up in the night, sought for his purse in the dark, and went about as if he were well. Toward morning pain set in; in the afternoon I found the edge of the wound infiltrated. The upshot was panophthalmitis.

Two things might, and probably would, have averted this issue: (1) If the patient had continued to be quiet, the wound would probably not have been irritated and infected, as its aspect had previously been excellent. (2) If I had made a conjunctival flap it would probably have prevented the germs from invading the corneal wound on the third day.

In all cases of conjunctivitis and dacryocystitis I shall henceforth—unless my views change—make a conjunctival flap. The conjunctival flap does not obviate, it perhaps favors, primary infection—*i.e.*, infection during the operation. But against this we may protect our patient by scrupulous asepsis and antisepsis. Sterilizing the conjunctival and lachrymal sacs before the operation, irrigating the wound during the operation, and sterilizing the anterior chamber

and the conjunctiva after it, will prevent primary affection, as it did in the case under consideration. When the eye has to be kept bandaged for a few days, the bacteria, multiplying in the conjunctival sac, may come in contact with the edge of the conjunctival wound, where, as experiments demonstrate, they do no harm, but the conjunctival flap, the inner surface of which is united to the underlying tissue, prevents them from reaching the edge of the corneal wound. If the lips of the wound do not apply accurately, but, as frequently occurs, the corneal lip projects somewhat over the scleral, bacteria will have easier access, and, if the patient be restless and move his eye, they are directly stroked into the wound, the wound is not only more efficiently inoculated, but the abundant tissue juice, poured out from its irritated lips, furnishes an appropriate nutriment for the microbes.

The safest treatment in dacryocystitis is, of course, to destroy the sac, postponing the operation until the conjunctiva has become white.

## 5.—Results.

The *visual acuteness* obtained has been as follows:

| S. | No. of cases. | S. | No. of cases. |
|---|---|---|---|
| $\frac{10}{10}$ | 2 | $\frac{20}{200}$ | 1 |
| $\frac{10}{10}$ | 3 | $\frac{15}{200}$ | 1 |
| $\frac{10}{10}$ | 4 | $\frac{10}{200}$ | 1 |
| $\frac{10}{10}$ | 3 | $\frac{8}{200}$ | 1 |
| $\frac{10}{10}$ | 5 | $\frac{6}{200}$ | 1 |
| $\frac{20}{100}$ | 6 | 0 | 1 |

If with regard to the perfection of the operative results, we call those cases ideal recoveries in which the pupillary area is not obstructed by inflammatory products, the pupil is central and movable, even if a few filiform adhesions are present, we have obtained *eighteen perfect or ideal recoveries among twenty-nine cases—i.e.*, 66 %.

There was one case of loss. All the imperfections in the healing process that have been noted can be called unimportant; namely, a few cases of oval or displaced pupil,

and three cases in which the capsular obstruction was made somewhat denser by inflammatory products, yet not so much as to require any other after-operation than a simple discission with a knife-needle.

### 6.—Comparison of the Two Methods.

*If we compare the simple extraction with the extraction combined with iridectomy*, we find as **advantages** of the former the following:

1. It preserves the natural appearance of the eye.
2. The acuteness of vision, other things being equal, is greater.
3. Eccentric vision and "orientation" (correct localization of objects in the visual field) are much better, adding a great deal to the comfort and safety of the patient.
4. Parts in direct connection with the ciliary body, such as shreds of the capsule and iris, are not so liable to be locked up in the wound and thus transmit morbid conditions to the most vulnerable part of the eye, the ciliary body.
5. It may not necessitate so many after-operations.

As **disadvantages** may be mentioned:

1. The technique of the operation is more difficult in all its parts: (*a*) The section must be larger, to let the lens pass through an aperture, the size of which is diminished by the iris lying in it; it must be more accurate to secure coaptation, and it must be more rapidly performed in order to prevent the iris from falling before the knife. (*b*) The opening of the capsule requires a deeper introduction of the cystitome into the anterior chamber. (*c*) The expulsion of the lens is more difficult, and (*d*) the cleansing of the pupillary area is much more troublesome than in the combined extraction.
2. Prolapse of iris and posterior synechiæ are more numerous.
3. It requires a quieter and more manageable patient during and after the operation than is needed in the combined extraction.
4. It is not applicable to all patients, whereas combined extraction can be used as a general method.

### 7.—Indications for the Iridectomy.

This brings me to the last point which I want to consider, namely, *when should an iridectomy* be made.

1. When in case of fluidity of the vitreous and rupture of the suspensory ligament of the lens, the cataract on pressure does not present in the wound, but only vitreous escapes.

This occurred in the case of Mr. E. S. R., æt. sixty-five, operated on Oct. 11, 1886. After a regular corneal section, fluid vitreous escaped. When the cystitome was pressed on the capsule, the lens receded. The speculum was removed, and an unsuccessful attempt made to expel the lens by pressure through the lids. A further escape of vitreous was the only consequence. The speculum was reinserted, a small piece of iris exsected, the speculum removed, and the lens in its capsule pressed out with the lids, without further loss of vitreous. Recovery undisturbed. Sight good.

2. When the section is insufficient and the iris, in the attempt to expel the lens, has been pushed into the wound, and vitreous presents or escapes.

This happened in the first patient on whom I tried the method. The exsection of the protruding iris made the completion of the operation easy. Result good.

3. When during the operation the iris has been bruised or injured.

This happened in the case of Brother C., æt. sixty-seven, who had a hypermature cataract. During a tedious attempt to extract the thickened centre of the anterior capsule with a pair of forceps, the iris was caught between the branches, and so much bruised that I thought it advisable to exsect the injured portion. After this was done the lens came out easily, and the whole capsule was then extracted without an effort. Recovery and result good.

4. When the sphincter is unyielding, more especially when a peripheric piece of iris falling before the knife has been exsected. I would rather cut a rigid sphincter than expose the patient to prolapse of vitreous in the attempt to overcome its contraction by undue pressure.[1]

5. When the iris, after the expulsion of the lens and cleansing of the pupillary field, proves irreducible.

[1] I successfully acted on this principle in a case operated on, Feb. 27, 1887.

This happened in three patients, all of whom, after the iridectomy, made a good recovery. I include in this category all cases in which the pupil does not become perfectly central and round. They indicate lack of elasticity of the iris tissue, and are not to be trusted, though in some of them the paralysis of the sphincter may be transient. It is better to exsect a piece of iris on the spot than to run the risk of a subsequent prolapse. When a prolapse is found on the second day, it may or may not be cut, but after the second day it is advisable, I think, not to touch it. The experience in the series under consideration has been in favor of leaving it alone.

To conclude, I may be allowed to **express my opinion on the value of the method** of extraction without iridectomy, as follows:

*Simple extraction is an operation of the highest order, and practicable in the majority of cases with the same degree of safety as the extraction combined with iridectomy. In a considerable minority, however, the latter method is preferable; in a number of cases the indications for the iridectomy manifest themselves before, in others only during, the operation.*

# A FAMILY HISTORY OF BLINDNESS FROM GLAUCOMA.

By Dr. LUCIEN HOWE, of Buffalo, N. Y.

THE hereditary tendency of glaucoma is already too well known to be worthy of any special comment, Von Graefe having called attention to this phase of the disease many years ago.[1] The present example is reported because of the very unusual number in the same family who were thus afflicted, there being eight well-marked cases in three generations.

This family, Donnocker by name, originated in the township of Boston, Erie County, New York. In the first generation to which I would call attention there were six children—Fanny, Michael, Elizabeth, George, Dorothea, and Simon. Of these, George was affected. His symptoms, as gathered from his son, who is a clergyman and an intelligent man, and also from another member of the family, were substantially as follows: Vision good till about forty years of age. At that time he consulted Dr. Munn, of Rochester, on account of some failure of sight. The disease assumed an inflammatory type. In about six months the vision of one eye was lost, and within three years more he had become virtually blind in the other, the symptoms throughout being such as indicated clearly an attack of glaucoma of the inflammatory variety. This was the only victim in the generation mentioned. None of the children of his brothers and sisters, as far as can be learned, were troubled with any disease of the eyes, except such as might easily be accounted for, as due to conjunctivitis or simple affections.

[1] Arch. f. Ophth., xv., 3, 228. *Jour. of Amer. Med. Ass'n*, vol. ii., p. 185: "A Case of Hereditary Glaucoma," H. Harlan.

The descendants of George, however, were not so fortunate. His wife had normal vision. Their children were Martha, George, Catharine, Mary, John, and Caroline. Of these George and Catharine were similarly affected. The history of this George, who is now a clergyman, and sixty years old, is as follows: When twenty-eight years old, imperfect vision was noticed in the left eye. This was more apparent at intervals, in the manner frequently met with in glaucoma. One year later an iridectomy was made on the left eye by Dr. Noyes, of New York, but even by that time the vision had decreased to fingers at four feet, at which point it remained February 25, 1880. The patient was seen last on July 3, 1885, and then he was totally blind in that eye. The other eye was entirely destroyed by an accident when he was a boy.

I will conclude this branch of the family and consider George's descendants before referring to his sister Catharine or her children.

The wife of this George—the second—had also perfect vision. Their children were Luella, Delbert, Arthur, Ellsworth, and Emma. Luella, now Mrs. B., lives in Freeman, Steuben county, New York. She was first seen by me on the 28th of March, 1883, and was then thirty-two years of age. She stated that her vision was good till four years before, being able to do sewing and other fine work of a similar nature. At that time she began to have pain in the left eye, which subsequently increased with all the characteristics of glaucoma; the vision meanwhile failing until nine months before, when the left became completely blind. On examination this eye was found to present a typical picture of absolute glaucoma, and she also had a chronic glaucoma in the right, but good perception of light. An iridectomy was performed, but no improvement resulted.

Her brother Arthur was seen in January, 1884. The vision was but slightly impaired, it being perfect in one eye and equal to $\frac{20}{40}$ in the other. In that eye, however, there was a perceptible excavation of the disc, and a slight contraction of the field of vision.

Another brother, Ellsworth, I have also examined, but the eyes are unaffected. The youngest child, Emma, has not escaped so easily. She was seen first on the 6th of December, 1883, and was then seventeen years of age, and lived at Stony Fort, Tioga County, Pa. She stated that the vision began to fail about three

months previously in both eyes at the same time. With her the disease was of a non-inflammatory character, but advanced rapidly, so that at the time of the consultation the vision of the right was equal to only perception of light, and with the left she could count fingers at three feet ten inches. An iridectomy was at once made upon both eyes. In the right there was little, if any improvement, but in the left, the vision increased to fingers at six feet, and the field, by accurate measurement, was considerably more than doubled. This record was made soon after the operation. A subsequent examination, however, showed that the vision had increased to fingers at ten feet.

So much for the clinical history of the descendants of the second George Donnocker. Let us now consider his sister Catharine and her descendants. I am not able to speak of her case from personal examination. Two independent accounts, however, from different members of her family, agree in the fact that her vision was good until she was twenty-five years of age, and then began to fail gradually. Within a little over four years she had entirely lost the vision of one eye, and a few months later the remaining one also became blind. One of her children, who described her symptoms by letter, says that the eyes are "very hard when pressed upon," and her subjective symptoms are such that one may be able with fairness to infer that her trouble was also of a glaucomatous nature. She married a man by the name of Eiss, whose vision was normal, as far as can be learned. Their children were Daniel, George, John, and Celia. Of these the first and the third were affected. Daniel Eiss, who lives in Boston, N. Y., was seen on the 20th of May, 1879. He was then twenty-nine years of age. He stated that his vision was good till three years previously, when both sclerotics were noticed to be slightly injected and the vision imperfect. In the summer of 1877 these symptoms disappeared, but in the following winter and during all of 1878 they grew gradually worse. At the time of the consultation referred to, in both there was slight ciliary injection, with the veins in the sclerotic dilated, pupil wide and immovable, the optic disc with deep excavation, T + 3, and V = $\frac{1}{\infty}$. These, with other symptoms, characterize it, like the others, as absolute glaucoma. No operation was made.

The second son, George Eiss, lives in Buffalo, and is now about thirty years of age. I am told he considers his vision

perfect, as does also his sister Celia. The third son, John, is the final example to which I would call attention. He was first seen on the third of June, 1879, and also lived in Boston, N. Y., and was at that time twenty-five years old. He stated that the vision began to fail about six years previously, but until a few months before he could see large objects quite readily. At the time of the examination his left eye presented all the typical features of chronic glaucoma, with vision equal to perception of light. During the three or four months previously he noticed that the vision of the right was also somewhat affected, and at the time referred to, the symptoms of glaucoma were well defined. He had a typical excavation, and vision equal to twenty seventieths. He was seen at intervals until the 24th of January following, and continued to decline operation until the field of vision contracted so greatly that it was impossible for him to carry on his occupation as a farmer, with any degree of comfort. An iridectomy was accordingly made upon this eye. The acuteness of vision was nearly doubled, and the field increased also in proportional degree. At present the left, of course, remains blind, but with the one operated upon he has no further difficulty. The youngest sister is, thus far, unaffected.

In this generation several are already married, but their children are too young to expect any development of glaucoma.

To recapitulate. We find in this family eight individuals more or less affected. Of these I have been able to examine and satisfy myself as to the existence of glaucoma in six, and the history is sufficiently definite to warrant the conclusion that the same trouble existed in two others. Out of the eight, four have been operated upon, and the iridectomy has at least prolonged the duration of vision for three. Five have been totally blind in both eyes, two in one eye, and in one the vision is slightly affected in one eye.

Examples of some hereditary tendency to glaucoma already exist in the literature of the subject, but I am not aware of any case where an opportunity was offered of determining the existence of the disease in so many individuals of the same family.

The following tabular arrangement indicates by the italics those who were affected:

| | | |
|---|---|---|
| | | *Luella.* |
| | | Delbert. |
| Fanny. | Martha. | *Arthur.* |
| Michael. | *George.* | *Ellsworth.* |
| Elizabeth. | Catharine. | Emma. |
| (*George.*) | Mary. | |
| Dorothea. | John. | *Daniel.* |
| Simon. | *Caroline.* | George. |
| | | *John.* |
| | | Celia. |

# SYSTEMATIC REPORT ON THE PROGRESS OF OPHTHALMOLOGY DURING THE FIRST AND SECOND QUARTERS OF THE YEAR 1886.

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Sections I.–V. Reviewed by Prof. H. MAGNUS.

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13. VOSSIUS. Guide to the use of the ophthalmoscope; for physicians and students. Berlin, 1886.

14. ZEPLER. The influence of intermarriage on the descendants, with special reference to congenital blindness. Inaug. Diss. Breslau, 1886.

The second volume of BUCK's (1) valuable book maintains the standard established in the first, and will prove useful both to the specialist and to the general practitioner. We shall call attention to those articles only that have reference to ophthalmological subjects and are marked almost without exception by their condensed form, care, and accuracy. Diseases of the choroid are described by W. C. Ayres; cocaine, by W. P. Balles; color-blindness (with a colored plate), by B. Joy Jeffries; conjunctivitis, by Samuel Theobald; affections of the cornea, with a beautiful chromo-lithographic plate showing ten pathological conditions of this tissue, by Frank Bueler; diplopia, by John Green; development of the

eye, by Benj. Sharp; diseases of the lids, by W. C. Ayres; injuries of the eye, by W. S. Dennett; tumors, by Adolf Alt.

BURNETT.

FIEUZAL (3) shows the necessity of a laboratory connected with the ophthalmic clinic, as it exists at the hospice des quinze-vingts. Hänsell briefly describes its arrangement and methods of working, and sets forth the objects of the laboratory, whence an atlas of the anatomy and histology of the eye will soon be issued.

v. MITTLESTÄDT.

The ophthalmoscopic sketch-book of HAAB (4) is a very practical aid in preserving pictures of the fundus, enabling even observers not skilled with the pencil to do so. We believe the book is equally useful for practice and instruction in ophthalmoscopy.

KERSCHBAUMER'S (5) study of the subject of blindness is an excellent one, and although we do not agree with him on many points, especially in the latter half, this does not prevent us from recognizing its importance.

In the first section of the book, Kerschbaumer discusses blindness in Salzburg. In that duchy there are 15.28 blind to every 10,000 inhabitants. The danger of becoming blind constantly increases, according to Kerschbaumer, after the age of fifteen, but this increase is not rapid until after the age of fifty, a result which nearly agrees with that previously found by me.

KLEIN (6) has prepared a compendium, intended for physicians and students, from his larger text-book of ophthalmology, which appeared in 1879.

LINNARTZ (7) makes the following demands: (1) The teacher of deaf-mutes must be familiar with the present status of ophthalmology and its most important laws; (2) the physician must give an opinion of the vision of every deaf-mute child before it enters the institution; (3) the more advanced deaf-mute scholars must be instructed in the preservation and care of their eyes, sight being more important to them than any other sense.

The fourth edition of MEYER'S (8) excellent text-book has appeared. Its value has been so generally recognized that a recommendation of it must seem superfluous. The progress which ophthalmology has made since the last edition of the book has been duly recognized and incorporated in the new one.

In view of the unreserved favor with which SCHMIDT-RIMPLER'S (9) text-book was received when it appeared in 1885, it is not

surprising that already a new edition has become necessary. It is undoubtedly one of our best text-books.

STELLWAG (10) treats particularly of en- and ectropium and the operation for cataract.

TIPTON'S (12) experience confirms that of the reviewer as to the absence of trachoma in the negro. Eye operations do well, and though the negroes nearly all have syphilis (? K.), its course is usually very mild. BURNETT.

VOSSIUS (13) has published a very useful guide to ophthalmoscopy for students and physicians. The optical and physical conditions are presented in a condensed form, and in a manner adapted to the necessities of the general practitioner.

ZEPLER (14) comes to the following conclusions in regard to the injurious influence of intermarriage: (1) Blood-relationship among absolutely healthy families is not a source of danger to the offspring; (2) the injury done the latter by blood-relationship can be explained by potential heredity, the influence of which is sometimes increased by accidental causes; (3) collateral heredity occurs in a comparatively large number of cases apart from consanguinity; but the actually existing conditions can only be determined by statistics of marriage among relatives.

*b.*—STATISTICAL PAPERS.

15. AMSTERDAM. Vereeniging tot oprichting en instandhouding eener Inrichting voor Ooglijers. Destiende Verslag. May, 1886.

16. Seventeenth annual report of the BROOKLYN EYE AND EAR HOSPITAL, for the year 1885.

17. CHISOLM. Eighth annual report of the Presbyterian Eye, Ear, and Throat Charity Hospital, for 1885.

18. FIEUZAL. Compte rendu de la clinique pour l'année 1885. *Bull. de la clin. d' ophth. nat. des quinze-vingts*, vol. iv., No. 1, Jan.–March, 1886.

19. HALTENHOFF. Quatrième rapport de la clinique ophthalmique du Molard. Genève, 1886.

20. MEYHÖFER. Report on his ophthalmic clinic during the years 1884 and 1885, with remarks on cataract-operations. Görlitz, 1886.

21. NEWARK CHARITABLE EYE AND EAR INFIRMARY. Sixth annual report.

22. SAMELSOHN. Cologne Ophthalmic Institute for the Poor. Eleventh annual report, for the year 1885. New patients, 3,831 ; 475 operations.

23. SCHENKL. Report on the operations performed at the German ophthalmic clinic at Prague, from April, 1883, until May, 1886. *Prager med. Wochenschr.*, 1886, No. 17.

24. SCHIESS-GEMUSEUS. Ophthalmic Institute at Basle. Twenty-second annual report, from Jan. 1, 1885, to Jan. 1, 1886. Basle, 1886.

25. WICHERKIEWICZ. Eighth annual report on the Ophthalmic Institute for the Poor of Posen, for the year 1885. Posen, 1886.

26. WILLS' EYE HOSPITAL. Report for the year 1885.

In AMSTERDAM (15), Gori, Gunning, Juda, and Rijnbeck treated 5,728 patients. Into the house 519 persons were admitted. Cataract-operations 46, squint-operations 61, iridectomies 51.

Surgeons in BROOKLYN (16) are Mathewson, Prout, and Rushmore. Number of eye-cases treated in 1885, 4,131 ; 9 extractions.

CHISOLM (17) treated 4,291 eye-cases. Cataract-extractions, 124 ; iridectomies, 69 ; enucleations, 54 ; eviscerations, 9 ; squint-operations, 115. BURNETT.

FIEUZAL (18) treated 9,332 new patients, and performed 1,412 operations. Cataract-extractions, 355, among them 231 senile cataracts. Good results in 81 per cent., moderate in 15 per cent., failures 4 per cent. v. MITTELSTÄDT.

HALTENHOFF (19) treated 3,236 new patients in two years. Operations, 146. One third of the entire number were children. Almost 26 per cent. of the whole number were new-born children with blennorrhœa neonatorum.

MEYHÖFER (20) reports 5,071 new eye-patients. Extractions, according to Graefe, 64 ; massage of the lens, 13 ; enucleations, 26 ; exenterations, 7 ; divisions of the optic nerve, 4.

In NEWARK (21) Kipp treated 2,552 eye-patients. Cataract-extractions, 14 ; iridectomies, 7 ; squint-operations, 18 ; enucleations, 3. BURNETT.

During the three years that SCHENKL (23) had charge of the Prague clinic, he performed 949 more important operations : among them, 144 flap-extractions, 123 of which with good, 11 with moderate result ; ten failures. Frontal extractions 159, 148 of them with good, 9 moderate, result ; 3 failures.

SCHIESS-GEMUSEUS (24) treated 1,855 new patients, and performed 181 operations: among them, 56 extractions, 53 with good, one with moderate, result, and 2 failures; 7 enucleations; 25 squint-operations. A number of very detailed clinical histories is added.

WICHERKIEWICZ (25) treated 3,612 patients. A paper on operating unripe cataracts, and on cocaine, is added.

In WILLS' HOSPITAL (26) the number of patients was 6,631; the number of operations, 1,181; among them, 111 extractions.

BURNETT.

## II.—GENERAL PATHOLOGY, DIAGNOSIS, AND THERAPEUTICS.

### *a.*—GENERAL PATHOLOGY AND DIAGNOSIS.

27. CHIBRET. Skiascopie; ses avantages; sa place en ophthalmologie. *Arch. d' ophth.*, vol. vi., No. 2, March–April, 1886.

28. DUCI. Altro innesto di bulbo di coniglio sull'uomo. *Gaz. med. ital. lomb.*, vol. xlvi., April, 1886, and *Ann. di. ottalm.*, vol. xv., p. 51.

29. GELLÉ. Ophthalmotonométrie. *Gaz. des hôp.*, 1886, p. 464.

30. GILLET DE GRANDMONT. Inoculation expérimentale de le tuberculose de l'œil. *Rec. d'ophth.*, Feb., 1886.

31. MAY. Enucleation with transplantation and re-implantation of eyes. *Med. Rec.*, May 29, 1886.

32. PIERD'HOUY. Secondo tentativo di innesto di occhio di coniglio sull'uomo. *Gaz. med. ital. lomb.*, vol. lxvi., No. 9, Feb., 1886.

33. TERRIER. Quelques recherches et quelques remarques sur la greffe oculaire. *Arch. d'ophth.*, vol. vii., 1, Jan.–Feb., 1886.

34. UHTHOFF. The diagnostic importance of the reflex immobility of the pupil. *Berl. klin. Wochenschr.*, 1886, No. 3.

35. VALK. The diagnosis of astigmatism with the ophthalmoscope. *Med. Rec.*, June 12, 1886.

CHIBRET (27) calls skiascopy the method of determining refraction, described by Cuignet as keratoscopy, and practised especially in England. He thinks that particularly in spasm of the accommodation it is more reliable than the examination in the upright

image. As the name indicates, the method is based on the observation of shadows. v. MITTELSTÄDT.

The transplantation of enucleated eyes has lately been attempted by a number of observers, whose conclusions have mostly been unfavorable. The reviewer fully agrees with them in condemning this latest addition to our operative procedures. He never obtained a satisfactory result in a longer series of experiments (about 30), and will soon report at greater length in a dissertation on the subject. A review of the following papers is appended.

DUCI (28) reports a second attempt of the lately deceased Pierd'houy to transplant a rabbit's eye into the human orbit. It was performed on a young woman of thirty, whose right eye was to be enucleated on account of beginning sympathetic ophthalmia of the left. After detaching and fixing the tendons of the muscles to the conjunctiva, and then to the skin of the forehead, the diseased eyeball was removed and the rabbit's eye, which had just been enucleated, was put into its place. After a failure to unite the stumps of the optic nerve, the conjunctiva and the ends of the tendons were attached to the band of conjunctiva surrounding the cornea of the rabbit's eye. The momentary cosmetic effect was surprising. When the antiseptic bandage was removed on the seventh day, the eyeball was painless, firmly united, and movable in all directions, but the cornea uniformly hazy. Two days later its necrosis began, followed by perforation and escape of the lens. The sclera remained united with Tenon's capsule, but the final outcome, as in the first case, was a painless, atrophic stump, well adapted for wearing an artificial eye. DANTONE.

PIERD'HOUY'S (32) case was that of a coppersmith twenty-five years old. Strictest antisepsis during and after the operation. On the third day the conjunctiva had become attached, and the cornea was sensitive beyond doubt. Every thing went well until the sixth day, when the cornea became hazy, a central ulcer developed, which perforated on the eleventh day, and on the fifteenth the lens escaped, and the result was atrophy of the globe. The conjunctiva and sclera remained united and were nourished; and as the stump was free from pain and irritation, an artificial eye could be worn upon it. DANTONE.

TERRIER (33) has prepared a compilation of the attempts made to transplant the eye of an animal into the human orbit, and reports two observations of his own. With the exception of Brad-

fort's case, in which the result was still satisfactory two months and twenty days later, they were all failures. In Terrier's first case the transplanted eye became gangrenous, and was gradually cast out, although a broad strip of conjunctiva around the cornea and as much episcleral tissue as possible had been preserved. In the second case, in which Terrier had partially operated according to Bradfort (suture through muscle and conjunctiva), the cornea perforated on the nineteenth day, followed by escape of contents of the globe, whereupon, in view of the experience of Rohmer, who had seen sympathetic ophthalmia produced by such a stump, it was removed. V. MIDDLESTÄDT.

MAY (31) gives the details of twenty-four operations on rabbits, and from the results obtained the author believes the operation in man a justifiable one. (He has changed his opinion. See his paper in this volume. K.) BURNETT.

GELLÉ (29) tests tension by the resistance the globe offers to sound, and uses a modification of Parsonval's telephone for this purpose. MARCKWORT.

GILLET DE GRANDMONT (30) introduced a tubercle taken from the lung of a human corpse into the anterior chamber of a rabbit. Forty-nine days later fifteen to twenty small tubercles were observed upon the iris. On the sixty-eighth day the eye was enucleated, the animal being apparently in good health; seventeen days later it died of general tuberculosis. As the tubercle was not taken from the human corpse until forty-eight hours after death, it was placed for a few moments in a concentrated (1 : 4) alcoholic solution of carbolic acid, which probably destroyed the septic germs, but not the tubercle. MARCKWORT.

UHTHOFF (34) found reflex immobility of the pupil combined with preservation of reaction on convergence in 136 among 166 cases, under the following circumstances: In tabes in 92 cases = 67 per cent. of all cases. The pupils were of unequal width in one fourth of all cases; unilateral paralysis of accommodation in only 5 cases.

In dementia paralytica in 12 cases.
In syphilis in 11 cases.
In other cerebral affections in 8 cases.
In multiple sclerosis in 2 cases.
In railway spine in 2 cases.
In injury of the head in 1 case.
In congenital feeble-mindedness in 1 case.
In abuse of tobacco in 1 case.
In hystero-epilepsy in 1 case.
In hemianæsthesia dextra in 1 case.
No cause assignable in 3 cases.

Reflex immobility of the pupil without reaction on convergence was found in 30 cases, as follows:

In syphilis in 8 cases.
In tabes in 3 cases.
In progressive paralysis in 2 cases.
In injury in 2 cases.
In "cold" in 1 case.
In beginning tuberculosis of the brain in 1 case.
In tumor cerebri in 1 case.
No cause assignable in 12 cases.

VALK (35) believes that the majority of ophthalmoscopic observers cannot perfectly control their accommodation, and for that reason the axis of the correcting cylinder must be at right angles to the vessels that are most distinctly seen without a glass, or with the weakest glass, and that in hypermetropic astigmatism it should be parallel to them. BURNETT.

### *b.*—GENERAL THERAPEUTICS.

36. GUAITA. Asepsi e antisepsi. Rendiconto delle sedule della Soc. ottalm. ital. *Ann. di ottalm.*, vol. xiv., 5, 6.

37. NOYES. Antiseptics in eye-surgery. *N. Y. Med. Journ.*, Jan. 16, 1886.

38. DE WECKER. Notice historique complémentaire d'actualité. *Arch. d'ophth.*, vol. vi., 3, May–June, 1886.

GUAITA (36) insists that asepsis, *i. e.*, the prevention of infection through parasites, should be distinguished from antisepsis, the destruction of the microbes. Most of the substances now in use act as aseptics, especially iodoform and boracic acid, while sublimate and, to a certain extent, carbolic acid act as antiseptics. DANTONE.

NOYES (37) expresses himself thoroughly in favor of antiseptic precautions in eye-surgery. The procedures he recommends are: The avoidance of medicated solutions containing infective material, or contaminated instruments; to remove from the eye all infective material; to have the hands perfectly clean; and to see that the surroundings are clean and free from all infective germs. As an antiseptic, he prefers the sublimate or biniodide of mercury. BURNETT.

DE WECKER (38), in his answer to Panas (*v. Arch. d'ophth.*, vol. vi., No. 2, March–April, 1886, p. 97), points out the difference between his and Critchett's method, and claims for himself the introduction of the section including exactly one third of the circumference of the cornea and lying in the limbus. He does not believe that injections into the anterior chamber sterilize the eye, but mechanically wash away germs that may have entered. He thinks that the re-introduction of the old flap-extraction will

be due to the efforts of several authors, but not less to antiseptics, local anæsthesia, syringing out the anterior chamber, and eserine. Panas, in a note to de Wecker's communication, maintains the correctness of his former assertions. v. MITTELSTÄDT.

## III.—INSTRUMENTS AND REMEDIES.

### *a.*—INSTRUMENTS AND TECHNICAL CONTRIVANCES.

39. BELLJARMINOW. The usefulness and accuracy of the test-types now in use for determining acuteness of vision. *Wjestnik ophthal.*, Jan.–Feb., 1886.

40. GREEN. On spectacle-lenses of asymmetrical curvature. *Amer. Jour. Ophth.*, March, 1886.

41. GROENOUW. Contributions to the mathematical calculation of the action of prismatic glasses. Inaug. Diss., Berlin, 1886.

42. GUAITA. Letto per operazioni ottalmiche. *Ann. di ottalm.*, vol. xiv., 5, 6.

43. JULER. A refraction ophthalmoscope with electric light. *Centralbl. f. prakt. Augenhk.*, 1886, p. 48.

44. LANDOLT. Du maniement des instruments en chirurgie oculaire. Conférence d'ouverture du cours de chirurgie oculaire fait à l'école pratique de la faculté de médecine. *Le Progr. méd*, 1886, No. 1, p. 3.

45. LEROY. Sur l'ophthalmomètre de precision. *Ann. d'ocul.*, vol. xcv., p. 209.

46. MANGIN et CHIBRET. Phare ophthalmologique. *Ann. d'ocul.*, vol. xcv., p. 235.

47. MASSELON. Présentation de la seconde édition de l'echelle métrique. *Ann. d'ocul.*, vol. xcv., p. 236.

48. PRIESTLEY SMITH. Small hand-lamp for ophthalmic purposes. *Centralbl. f. prakt. Augenhk.*, 1886, p. 112.

49. REYNOLDS. The prolate lens of Dr. Fox. Barsch's sphero-cylinders on one surface. *Amer. Journ. Ophth.*, April, 1886.

50. SCHMIDT-RIMPLER. Speculum. *Centralbl. f. prakt. Augenhk.*, 1886, p. 48.

51. SCHNELLER. Trachoma forceps. *Centralbl. f. prakt. Augenhk.*, 1886, p. 48,

With the aid of Helmholtz's ophthalmometer BELLJARMINOW (39) carefully examined the test-types of Snellen (three different editions), Schweigger, Wecker, Monoyer, Reich, Krükow, and Adamück, and from the results obtained he calculated the angle under which they are seen at the given distance. He found marked differences, not only between the various letters of the same series, but also between different lines of the same letter, or even different parts of the same line. Lines which appear exactly under an angle of 60″ (seconds) are rarely found on any of the cards. As movements of the person during the examination of his vision cannot be avoided, giving rise to small errors, the author thinks that slight inaccuracies in the letters (up to 3″) may be overlooked. He gives the following analysis of the test-types examined: 1. Types of Snellen in feet. Among ten letters examined, he found marked differences (up to 6.4″) in two; differences between lines of the same letter seldom occur. Execution of the letters very satisfactory. He finds that Snellen's test-types are the most useful of all. HIRSCHMANN.

GREEN (40) shows how all forms of compound lenses can be ground on revolving wheels, the radius of the wheel forming the radius of one cylinder, and the radius of the curvature of the rounded edge of the wheel constituting the radius of curvature of the cylinder at right angles to it. This last can even be made elliptical in form. BURNETT.

GUAITA (42) describes an elegant, adjustable, iron operating-bed which he had constructed at Siena, the head-rest of which in particular has been carefully made. DANTONE.

JULER (43) has arranged 9 + and 15 − glasses on a disc; the concave mirror, placed obliquely, is perforated at its upper edge, and receives the electric light from below, supplied by a small Leclanché battery.

MANGIN and CHIBRET (46) have constructed a special lamp for operations on the eye. (Helot-Trouvé's photophor is to be preferred, because it need not be kept in a particular vertical direction, so that light can fall directly from above on the object examined. —Rev.) MARCKWORT.

PRIESTLEY SMITH (48) has constructed a lamp consisting of two nickel tubes sliding over each other, the length of which is 170 *mm* and the diameter 45 *mm*. The lower tube contains, enclosed in a capsule with bayonet-catch, a candle, the flame of which is always kept at the same height by a spring. The upper tube

contains two lenses, placed opposite each other, of one and two inches focal length. The foci of these lenses coincide with the centre of the flame of the candle, being in one straight line with it.

REYNOLDS (49) has demonstrated on his improved Snellen's phakometer that the three cylinders in one lens, as ground by Barsch and described by Dr. L. W. Fox, are not simply spherocylinders, but have actually three foci. The fact however that the lines near their point of intersection cast halos upon the disc of the instrument shows an amount of irregular curvature which makes them unsuited to the correction of regular astigmatism.

BURNETT.

SCHMIDT-RIMPLER (50) writes as follows: "The specula generally in use are open to two objections: they are not strong enough, so that they can be pressed together by the patient's lids, and their removal cannot be rapidly accomplished, especially when they are fastened with screws. I have, therefore, constructed a speculum which, being made of steel, is less compressible, and the point of fixation of which is only at a short distance from the branches holding the lids; a spring is introduced between the branches, so that the speculum can be rapidly closed by pressure on a metallic button, and therefore easily removed. It can be used for either eye."

### *b.*—REMEDIES.

52. GLÄSSNER. Iodol. *Centrabl. f. prakt. Augenhk.*, 1886, p. 16.

53. KAZAUROW. Antipyrine in ophthalmology. *Wratsch*, No. 7.

54. LANDESBERG. The application of lanoline in ophthalmology. *Centrabl. f. prakt. Augenhk.*, 1886, p. 94.

55. DE WECKER. Injections et passements à l'éserine et antisepsie oculaire. *Ann. d'ocul.*, March–April, 1886.

GLÄSSNER (52) found that iodol acts just as favorably as iodoform in corneal ulcers and hypopyon-keratitis. Good results were also obtained in phlyctenular and trachomatous pannus with a 2 per cent. salve, also in superficial opacities of the cornea, and in one case of persistent serous iritis with opacities on the posterior surface of the cornea. In phlyctenulæ of the conjunctiva it failed. The salve seems, however, to accelerate the healing in the last stages

of trachoma, and to act beneficially in blepharitis ciliaris. Glässner thinks that iodol can take the place of iodoform in ophthalmology.

KAZAUROW (53) obtained good results with antipyrine in all cases of headache or ciliary pain accompanying diseases of the eye (keratitis, corneal ulcers, glaucoma, headache after cataract-extraction, foreign bodies in the orbit). In 14 cases a single dose of 1 grm. was sufficient. In a few cases the author had to give this dose three times before relief was obtained (optic neuritis, scleritis). The author prefers this remedy to salicylate of sodium, as it does not produce any unpleasant general symptoms.

HIRSCHMANN.

LANDESBERG (54) is satisfied that lanoline is the best basis for salves to be used on the eye. It does not become rancid, prevents decomposition of the drug, and does not irritate the eye in the least. It is of somewhat greater consistency than cosmoline and vaseline, and therefore does not melt so readily when in contact with the globe. It is rapidly absorbed. It takes up water easily, and an excess of it can therefore be readily removed from the eye by irrigation.

DE WECKER (55) recommends the injection of eserine into the anterior chamber in extraction of cataract, as it prevents prolapse of iris, favors healing, and suppresses secretion. He washes out the anterior chamber with eserine in hypopyon-keratitis, after sclerotomy.

## IV.—ANATOMY.

### *a.*—GENERAL AND COMPARATIVE ANATOMY.

56. CIACCIO. Gli occhi semplici de Ditteri vaguagliati coi composti. *La Spallanzani*, vol. xv., 2–3.

57. MORANO. Caso di anoftalmo congenito. *Ann. di ottalm.*, vol., xv., 1.

CIACCIO (56) compares anatomically the simple eyes of the diptera with the composite ones, and the retina of the facet-eyes with that of the eyes of vertebrates.

MORANO'S (57) case of congenital anophthalmus was that of an otherwise healthy, normal child, three months old, whose four brothers and sisters were similarly affected. They all died in their first year, probably from the effects of the miasma of those swampy regions.

DANTONE.

*b.*—LIDS AND MUSCLES.

58. MOTAIS. Recherches sur l'anatomie humaine et l'anatomie comparée de l'appareil moteur de l'œil. *Arch. d'ophth.*, vol. vi., 2.

59. PODWISOTZKY. The regeneration of the epithelium of Meibom's glands. *Wjestnik ophth.*, Jan.–Feb., 1886.

MOTAIS (58) in this concluding article publishes his studies on the mechanism of the movements of the eye, and the part played by Tenon's capsule, the lateral sheaths, the optic nerve, fascias, and fat. For the details of his experiments on the corpse, see the original. He found that the outer and inner duplicatures of Tenon's capsule follow the movements of the globe. The former is laid in folds on the side on which the muscle acts ; on the other side it is stretched. The orbital fat also moves. In the state of rest the eye is kept in position by the muscles, aponeuroses, lids, nerves, and blood-vessels. When one of the recti muscles contracts, the orbital end of the fascia "aileron ligamenteux" is stretched, the opposite one relaxed. The contraction of the muscle and the corresponding "aileron lig." furnishes a support for the periocular fatty tissue, against which it is pressed like a cushion, thus preventing the lateral dislocation of the globe. It is, therefore, not the "aileron lig." of the antagonist that plays this part. The "ailerons" are, therefore, checks to mobility, as was already assumed by Tenon. Motais considers them besides "agents modérateurs," which act the whole time the muscle is contracted. In a case of paretic insufficiency of the external rectus this could be cured by dividing the "aileron" of the same side. This operation, which confirms the experiments on the corpse, is, however, not advocated, as it has not yet been sufficiently studied, and, besides, is not an indifferent one on account of the injury to the fatty tissue. To facilitate further studies in this direction the author describes the anatomical conditions of the different muscles, their fascias and their connection with the neighboring muscles, etc., without an accurate knowledge of which the operation must not be attempted. V. MITTLESTÄDT.

PODWISOTZKY'S (59) experiments were made on rabbits, which have well-developed Meibomian glands. The glands were irritated by an incision parallel to the edge of the inverted lid, which touched the glands. The process of regeneration takes place only in the peripheric layer of the glands, which may, therefore, be called the formative layer. HIRSCHMANN.

### *c.*—RETINA AND VITREOUS.

60. FALCHI. Sull' istogenesi della retina e del nervo ottico e contribuzione alla patologia della retina. *Gazz. d. clin.*, 1886, No. 2.

61. HAENSELL. Recherches sur le corps vitré. *Bull. de la clin. nat. ophth. des quinze-vingts*, Jan.–March, 1886.

FALCHI (60) describes the development of the retina in embryos of the dog and ox, and the behavior of the retina in adult rabbits after injuries to it, and after injections of pus into the vitreous. DANTONE.

According to HAENSELL's (61) investigations the vitreous of the new-born consists of a central and a peripheric portion, of which the former forms Cloquet's canal and the zonula Zinnii; the latter, the vitreous proper and the hyaloid membrane. The vitreous is genuine connective tissue, not only in embryos but also in young persons. The cells of this tissue form nets, are arranged in lamellæ, and their offshoots form many anastomoses. The vitreous tissue is covered with endothelium, from which, afterwards, the hyaloid membrane develops. Karyokinetic figures were found in the posterior parts of the vitreous; from the latter, therefore, the future growth proceeds. As the development progresses, the protoplasm of the cells is converted into a transparent mass, and there remains only a reticulum of protoplasmatic threads, at the intersections of which there are small shining bodies, the remnants of the former nuclei. Between the different layers there is liquid. v. MITTELSTÄDT.

## V.—PHYSIOLOGY.

### *a.*—GENERAL PHYSIOLOGY.

62. CHARPENTIER. L'intensité des sensations lumineuses. *Arch. d'ophth.*, vol. vi., 1, Jan.–Feb., 1886.

63. DENISSENKO. The question of the changes produced in the eye by light. *Wojenno-med. Jour.*, Jan.–Feb., 1886.

64. HELMHOLTZ. Hand-book of physiological optics. Hamburg and Leipzig. First, second, and third parts; second revised edition.

65. IMBERT. Calcul de l'effet prismatique des verres décentrés. *Ann. d'ocul.*, vol. xcv., p. 146.

66. KOLLER. On the visual field. *Wiener med. Wochenschr.*, 1886, No. 9.

67. MICHEL, J. Topography of the temperature of the eye. *Arch. f. Ophth.*, vol. xxxii., 1.

68. RAMPOLDI. Sopra un fenomeno visivo suscitato della atropina. *Ann. uni. di med.*, vol. cclxxv., fasc., 824, 1886. Sopra alcuni fenomeni di contrasto visivo. *Ann. di ott.*, vol. xiv., 5, 6.

69. SCHUBERT. The position of the head in writing. *Arch. f. Ophth.*, vol. xxxii., 1.

70. UHTHOFF. The interdependence of acuteness of vision and the intensity of illumination. *Arch. f. Ophth.*, vol. xxxii., 1.

In accordance with the results of former papers CHARPENTIER (62) (*Arch. d'ophth.*) has constructed several curves, which show the ratio between the increase of the intensity of a source of light and the corresponding power of perception. The two factors do not increase in the same proportion, as the power of perception does not increase proportionately to the increasing illumination. The greatest differences are found when the intensity of illumination is very slight. The ratio between two perceptions of light is therefore not the same as that of the corresponding intensities. The same laws hold good for colors. V. MITTELSTÄDT.

DENISSENKO (63) compared the anatomical conditions of the retina and choroid of various species of animals which had been kept in the dark for some time before death, with the retina and choroid of similar animals which had been exposed to more or less intense light before death, and found marked differences Under the influence of light the blood-vessels of the choroid are not so well filled, while the hæmoglobin disappears, penetrating through the membrana vitrea into the pigment epithelium. The perivascular spaces of the chorio-capillaris, which in dark eyes are filled with yellowish lymph, are emptied under the influence of light. The lymph enters the retina. The pigment epithelium seems to be the source of the pigment, but not of the visual purple, which, together with the liquid surrounding the cells and the rods, comes from the choroid. Under the influence of light, most complicated, important changes in form, size, and position take place in all parts of the retina. Most of the elements increase in size, while the layers become thicker. The author thinks that light produces a state of physiological œdema in the retina or parts of the retina. (The changes observed by the author in the outer layers of the retina are essentially the same as those described by Engelmann and Gradenigo.—Rev.)

HIRSCHMANN.

As the older edition of his physiological optics had disappeared from trade, HELMHOLTZ (64) has concluded to prepare a new edition of that excellent work, for which he will have the thanks of all ophthalmologists. A short recapitulation only can be given here of the three parts which have thus far appeared. In the first seven paragraphs a description of the anatomy of the eye is given. The next nine are devoted to the dioptrics of the eye, the laws of refraction in systems of spherical surfaces, the dispersion-images on the retina, the mechanics of accommodation, the dispersion of colors in the eye, astigmatism, the entoptic phenomena, the reflection of light from the fundus, and the ophthalmoscope. HORSTMANN.

KOLLER (66) found that when the eyeball is compressed until amblyopia ensues, the obscuration of the visual field always begins on the nasal side, while a portion of retina surrounding the optic nerve retains its function.

MICHEL (67) found that the mean temperature in the anterior chamber is 31.9°, while at the centre of the vitreous it is 36.1°, which probably is also the mean temperature of the centre of the lens. The low temperature of the anterior chamber rapidly rises 2–3° when the lids are closed. Applications of ice reduce the temperature 13–15° in a minute and a half.

RAMPOLDI (68), while suffering from conjunctivitis, put a drop of atropine into the eye at night by mistake instead of the zinc solution. After the lapse of a quarter of an hour he observed, to his surprise, a pale, trembling light, which seemed to cling to the edges of the lids, and lasted about five minutes. He subsequently repeated the experiment on himself and others in a darkeened room, and found that the phenomenon is regularly observed during the first half hour after the instillation of the atropine—at the beginning, therefore, of the paralysis of accommodation. He refers this phosphene to the tension of the peripheric portions of the retina, produced by the stretching of the zonula, due to the rapidly beginning disappearance of the tonus of the ciliary muscle. The process is probably the same as that which causes the well-known phosphene of accommodation. That the phosphene has its origin in the periphery of the retina the author infers from the fact that, in a case of retinitis pigmentosa, where the peripheral parts of the retina had lost their function while central vision was still relatively good, the phosphene in question could not be produced. The author found that duboisine acted simi-

larly to atropine, while weaker mydriatics (cocaine, jaborine), which have only a slight influence on the accommodation, or none at all, and the myotics, fail to produce the phosphene.

DANTONE.

*b.*—IRIS.

71. HAAB. Observation of a new reflex action of the pupil. *Correspondenzbl. f. Schweizer Aerzte*, 1886, No. 6.

72. HEDDAEUS. The reaction of the pupil to light: its test, measurement, and clinical importance. Wiesbaden, 1886: J. F. Bergmann. A review of this excellent, lucid, and exhaustive paper cannot be given here, but we desire to call the particular attention of our colleagues to it.

*c.*—RETINA.

73. EXNER. The manner in which the periphery of the retina exercises its functions, and the seat of the after-images. *Arch. f. Ophth.*, vol. xxxii., 1. According to Exner, the periphery of the retina is superior to the centre in certain intensities of illumination and a certain rapidity of change. The physiological reason for this sensibility of the periphery is found in the ease with which it is exhausted and the rapidity of regeneration. Exner then upholds his view against that of Filehne, maintaining that the after-images have their seat in the retina, the positive one of the same color and the positive complementary one in a layer of the retina nearer the vitreous, the negative complementary one in a layer nearer the choroid.

Sections VI.–XI. reviewed by DR. HORSTMANN.

VI.—ANOMALIES OF REFRACTION AND ACCOMMODATION.

74. BJELOW. On glasses. *Wjestnik ophth.*, March–April, 1886.

75. FÖRSTER. The treatment of myopia. *Breslauer ärztl. Zeitschr.*, 1886, No. 4.

76. SCHWABE, G. Report on the examination of the eyes of the children of the "Realschule" at Rendnitz. From the tenth annual report of that school, 1886, p. 4.

77. SMITH, PRIESTLEY. On means for the prevention of myopia. *Ophth. Rev.*, 1886, No. 56, p. 153.

78. STEFFAN. Myopia at the "Gymnasium" at Frankfort. *v. Graefe's Arch. f. Ophth.*, vol. xxxii., 1, p. 267.

BJELOW (74) elaborates his former statements on the influence of glasses on the dynamic balance of the ocular muscles. He calls attention to the fact that correction of the myopia diminishes the lateral divergence or converts dynamic balance into latent convergence, while correction of hypermetropia diminishes the convergence at disposal. He then submits prismatic deflection in decentration of spherical glasses to a renewed examination. He believes that decentration by approach is practicable to the extent of 7 *mm* on each side, and decentration by removal to the extent of 4–6 *mm*. Woinow's statements, which are calculated for decentration up to 4 *mm*, are therefore incomplete. The author also discovered mistakes in them. He has calculated a more complete table, for which see the original. HIRSCHMANN.

FÖRSTER (75) attributes the origin and development of myopia, in the first place, to convergence of the axes of the eyes, the ocular muscles thereby exerting a pressure upon the eyeball and thus increasing the tension within it. As a result, the sclera and choroid become ectatic at the weakest point, the macula lutea. When the posterior pole is turned outwards in convergence, the optic nerve drags at that portion of the sclera situated at its temporal side, and also at the choroid lying upon it. The result is ectasia of the sclera, followed by atrophy of the choroid. As the increasing myopia demands an increasing convergence, and as the latter in turn produces an increase of tension, it is evident why the myopia frequently remains progressive. Although axis-myopia cannot be cured, yet we must try to prevent it, and, if once established, to check its development. Reading and writing should then be performed only at the proper distance. In young persons with a strong power of accommodation the myopia should be entirely corrected with the proper glasses. In those cases of myopia in which for ordinary type a greater distance than 25–30 *cm* cannot be obtained with concave glasses, combinations of concave glasses with prisms (base inwards) are advised. For details see the author's elaborate publication on the subject in these ARCHIVES, vol. xv., p. 399.

SCHWABE (76) found among the scholars of the Rendnitz school 29 per cent. myopic. He also noticed that the number of myopes, as well as the degree of myopia, increased from the lower to the higher classes. Of 85 scholars the father was said to be myopic

in 26 cases, the mother in 15, and both parents in 5 cases. The highest degrees could invariably be traced to heredity.

PRIESTLEY SMITH (77) recommends a desk properly constructed for writing and reading, and a frequently repeated examination of the eyes as to their vision and refraction, in order to prevent the spread of myopia.

STEFFAN (78) believes that the fight against school-myopia, or, more properly speaking, against the myopia the result of education, can only be successful when it is directed against too high aims and against methods of education which overburden the scholars with near work, especially work to be done at home. The teacher can do more to prevent myopia than the hygienist. The school-house constructed in accordance with all the demands of hygiene cannot alone prevent the development and growth of myopia.

## VII.—LIDS.

79. ANKE. Three cases of traumatic coloboma of the lid. *Centrlb. f. pr. Aug.*, 1886, p. 9.

80. DE BECK, D. Hard chancre of the eyelids and conjunctiva. Contributions from the ophth. clin., Med. College of Ohio, 1886, No. 3.

81. BENSON, ARTHUR. The more modern operations for trichiasis. *Ophth. Hosp. Rep.*, vol. xi., 1, p. 18.

82. DUJARDIN. Ankyloblépharon partiel et symmétrique. *Rev. clin. d'ocul.*, 1886, No. 5, p. 98.

83. EWETZKY, TH. Contribution to the knowledge of coloboma-cysts. Inaug. Diss., Moscow, 1886.

84. FANO. Emphysème des paupières provoqué par l'action de se moucher. *Journ. d'ocul.*, Feb., 1886.

85. GILMORE, A. P. A case of symblepharon of the lower lid with an operation. *Journ. Amer. Med. Assoc.*, April 24, 1886.

86. NORTON, G. S. Malignant tumors of the eyelids and orbit. N. Y. T. C. Rankin, 1886, No. 12.

87. PANAS. D'un nouveau procédé opératoire applicable au ptosis congénital et au ptosis paralytique. *Arch. d'ophth.*, vol. vi., 1, p. 1.

88. PONCET. Bactériologie du chalazion. *Soc. franç. d'ophth.*, April 28, 1886.

89. RAMPOLDI. Saggio di operazioni practicate sulle palpebre. *Ann. di ottalm.*, vol. xv., 1, p. 23.

90. ROBERTSON, ARGYLL. Central blepharoraphia. *Ophth. Soc. Unit. Kingd.*, March 11, 1886.

91. TYTLER, T. Spasmodic ectropion treated by the eye-speculum. *Brit. Med. Journ.*, 1886, p. 163.

92. VASSAUX. Bactériologie du chalazion. Séance de la soc. de biol., June 19, 1886.

ANKE (79) reports three cases of coloboma of the lid, produced by a blunt force. The rupture of the lids always took place at the convex edge of the tarsus. Sutures were applied and the healing was favorable in every case.

DE BECK (80) presents a compilation of the cases thus far observed of hard chancre of the lids and conjunctiva.

In partial trichiasis without ectropium BENSON (81) makes use of electrolysis. He attaches a needle to the negative pole of a small Leclanché element, and a larger plate to the positive pole. He then passes the needle into the follicle, and closes the current by bringing the plate in contact with the temple or region of the brows. After twenty seconds the needle is withdrawn, and the hair can easily be extracted, the follicle having been destroyed. In extensive trichiasis with or without ectropium Dianoux's operation as modified by Spencer Watson is indicated. After dividing the lids two incisions are made through the skin parallel to the edge of the lid, the one, as near as possible to the lashes, must be deep enough to meet the intermarginal incision, the other must only penetrate the skin of the lid. The upper flap must then be introduced beneath the flap containing the lashes and fastened with a suture at each end, while the latter takes the place of the skin flap. Thus the lashes are raised the full breadth of the flap, and are firmly supported above by the transplanted skin. In cases in which this operation is not sufficient, a strip of mucous membrane is transplanted from the inner surface of the lip to the mucous membrane of the eye. The edge of the lid is divided in such a manner that the anterior portion contains all the lashes with their roots. In the posterior portion two parallel incisions of proper length are made through the mucous membrane, and into the gap thus made a piece of mucous membrane from the lips is transplanted.

In a child seven month old, which had kept its eyes closed for three weeks in consequence of an eruption on the face, DUJARDIN

(82) observed ankyloblepharon in shape of a reddish membrane, which occupied symmetrically in both eyes the whole space between the outer commissure and the outer edge of the cornea, and which sprang from the conjunctiva of the lids, about one *mm* from the ciliary edge. The lids themselves had not grown together, neither was there any connection between the membrane and the globe. The membrane was divided in a horizontal direction, and the conjunctival insertion abscised, whereupon the child recovered. Arlt reported a very similar case in the report of the Ophthalmological Society, Heidelberg, 1881, p. 126. The author agrees with Arlt in assuming that the cause of the peculiar disease must be sought in a previous croupous conjunctivitis with organization of the membrane, but thinks this conjunctivitis is not one of the ordinary forms.

v. MITTELSTÄDT.

EWETZKY (83) reports twenty-two cases of formation of cysts in the lower lid, fourteen occurring in one eye only and eight in both; they were associated with congenital microphthalmus or anophthalmus, among them two observations of his own. Of the fourteen unilateral cases the eye was healthy in four cases, in the other ten there was micro- or anophthalmus. The cysts are produced by the failure of the fœtal cleft to close after inflammation in this region, and therefore are probably staphylomas which have detached themselves from the globe.

GILMORE (85) reports a case in which the symblepharon was detached and a flap of conjunctiva dissected from around the cornea and stitched to the ball over the denuded spot. The lid and ball were kept apart by a silver plate which entirely filled the space from canthus to canthus, and which was held in place by wires passed through two holes in the end and through the cheek.

BURNETT.

NORTON (86) gives the history in full of the following cases: (1) epithelioma of the lids; (2) epithelioma of inner canthus; (3) epithelioma of both upper and lower lids; (4) melanotic encephaloid carcinoma of the palpebral conjunctiva of the left eye; (5) tumor of the right caruncula lachrymalis; (6) encephaloid sarcoma of the orbit. A full account of the autopsy in the last case is added. BURNETT.

PANAS (87) describes a new method of operating for complete ptosis. The principle is not new, as the frontal muscle takes the place of the levator, and consists mainly in introducing and heal-

ing in a vertical flap springing from the tarsal edge of the lid beneath a bridge-flap situated at the edge of the orbit. Panas operates as follows : After fixing the skin of the forehead, a horn-plate is introduced and an incision made, concavity downwards, from one commissure to the other, corresponding about to the upper edge of the tarsus, leaving, however, in the middle a piece of skin undivided about 8 *mm* broad (afterwards the base of the flap). From the inner ends of these two incisions another vertical one is made to the dividing line between lid and brow near the orbital margin, where their upper ends are united by an incision, 2 *cm* long, concave downwards and continued a little beyond the other two. Finally, an incision, 3 *cm* long, is made parallel to the one last mentioned, just over the brows. The skin lying between the incisions, which must go to the periosteum, is detached without injury to the fascia tarso-orbitalis. The flap formed on the lid is loosened, pushed under the other, and its upper edge united by sutures with the upper edge of the incision along the brow. To prevent ectropium a suture is applied at both sides of the flap, which includes the ligamentum tarso-orbitale and the conjunctiva, and, passing subcutaneously, is fastened to the upper edge of the superciliary incision. The author reports cases which were operated according to this method with good results, and recommends it for complete ptosis, as he thinks that the methods generally in use are sufficient for the lighter cases. v. MITTELSTÄDT.

PONCET and BOUCHERON (88) found microbes in the chalazion. The latter made pure cultures and injected them into the tarsus of rabbits, and thus succeeded in producing a number of chalazia.

RAMPOLDI (89) describes four plastic operations performed by himself on the lids, among which one for ectropium of the upper lid by the substitution of tissue according to Gradenigo is worthy of note, the result of which was very satisfactory. Gradenigo removes the lashes of both lids, and then unites the latter by tarsoraphy. After union has taken place, a curved incision is made through the lower lid from one canthus to the other, and the mucous membrane is sutured to the cutis ; the lower lid supplies the defect in the shortened upper lid. DANTONE.

In cases in which, after enucleation, no artificial eye can be worn, ROBERTSON (90) recommends central blepharoraphy, to prevent irritation of the conjunctival sac and distortion of the lids, which result from the lack of a prothesis.

TYTLER (91) cured spasmodic ectropium by the repeated introduction of the speculum.

VASSAUX (92) did not find any microbes in chalazia which had not ulcerated; he thinks that Poncet and Boucheron were deceived. MARCKWORT.

## VIII.—LACHRYMAL APPARATUS.

93. DARRIER. De l'extraction de la glande lacrymale dans les cas de larmoiement incoercible. *Gaz. med. de Paris*, 1886, No. 8, p. 88.

94. DEBIERRE. Trois cas d'hypertrophie de la glande lacrymale. *Rev. gén. d'ophth.*, 1886, No. 4, p. 145.

95. MONTANELLI, H. Poche parole sulla cura delle malattie delle vie lagrimale. *Boll. d'ocul.*, vol. viii., 8, p. 205.

96. MORANO. Contribuzione alla terapia delle vie lagrimali. *Ann. di ottalm.*, vol. xiv., 5–6.

97. PROUT, J. S. Operations for the relief of lachrymal conjunctivitis and other injurious effects of retention of the tears. *N. Y. Med. Jour.*, 1886, No. 387, p. 485.

98. RAVÀ. Intorno ad un nuovo apparecchio per le injezioni medicamentose da praticarsi nelle vie lagrimali. *La Spallanzani*, vol. xv., 4.

99. v. REUSS. Congenital absence of all four lachrymal points. *Wiener med. Presse*, 1886, No. 7.

DARRIER (93) recommends extirpation of the lachrymal gland in cases in which epiphora cannot be checked, or in which a firm scar prevents the reopening of the tear passages.

MARCKWORT.

DEBIERRE (94) reports three cases of partial removal of the hypertrophied lachrymal gland, performed at Meyer's clinic. The operation is very simple: After inversion of the lids and previous instillation of cocaine, a longitudinal incision is made through the conjunctiva and the aponeurosis beneath it, the tumor (the hypertrophied gland) detached from the surrounding tissue with scissors, drawn out, and abscised with one cut. The hemorrhage can easily be checked by compression. The wound is closed with one or two sutures. As only a part of the gland is removed, the patient can still weep with that eye, though the quantity of the tears is somewhat diminished in comparison with the other eye.

MARCKWORT.

In two cases of dacryocystitis, MONTANELLI (95), besides probing the canal, irrigated it for half an hour with 500 grms of an antiseptic solution, and found that the catarrhal secretion and lachrymation soon ceased. DANTONE.

MORANO (96) believes that constrictions of the lachrymal canal are generally located in the upper part of the sac, or at least result from an inflammation of the mucous membrane at that point; the neglect of this circumstance is frequently the cause of the failure of the operation. In order to facilitate the medicamentous treatment of the mucous membrane, the author slits the lower canaliculus, not only upwards, as is usually done, but also downwards, and thus opens the apex of the sac by a linear incision. For this purpose he uses a knife, narrow at the end, and bearing a button like Weber's, but becoming much wider towards its base. DANTONE.

In obstinate cases of lachrymal conjunctivitis in which there is a displacement of the punctum, PROUT (97) has found a modification of the operation proposed by Critchett of great value. This consists in slitting the punctum and the canaliculus for a short distance, and then cutting out a portion of the wall and adjacent conjunctiva with the scissors. The histories of four cases are given. BURNETT.

Instead of a syringe RAVÀ (98) douches the lachrymal canal with a perforated probe, which is connected by means of a rubber tube with a balloon filled with water. DANTONE.

v. REUSS (99) found that in a boy, aged twelve, all four lachrymal points were absent, while the papillæ were present and the canals were represented in the lower lids by furrows; in the upper lids they were wanting.

## IX.—MUSCLES AND NERVES.

100. BERRY, G. A. Note on a case of strabismus divergens with homonymous diplopia. *Ophth. Rev.*, vol. v., No. 53, p. 67.

101. DU BOIS REYMOND, C. On measuring strabismus. *Centralbl. f. prakt. Augenhk.*, 1886, p. 1.

102. FROST, A. The early treatment of convergent strabismus. *Brit. Med. Jour.*, Jan. 16, 1886.

103. GILLET DE GRANDMONT. Du défaut de fusion comme cause de strabisme. *Rec. d'ophth.*, 1886, No. 5, p. 261.

104. HIRSCHBERG, J. Contribution to the knowledge of strabismus and the operation for it. *Centralbl. f. prakt. Augenhk.*, 1886, p. 5.

105. JAVAL. La théorie de la vision binoculaire élucidée par un cas de strabisme avec vision triple. *Soc. franç. d'ophth.*, April, 1886.

106. KALT, M. Recherches anatomiques et physiologiques sur les opérations du strabisme. *Thèse de Paris*, 1886.

107. LANDOLT. Procédé de ténotomie dans l'insuffisance musculaire. *Soc. franç. d'ophth.*, April, 1886.

108. MORRISON, RAY J. Two cases of strabismus with choroidal atrophy. *Amer. Jour. Ophth.*, vol. iii., 6, p. 158.

109. MOTAIS. Observations anatomiques et physiologiques sur la strabotomie. *Soc. franç. d'ophth.*, April, 1886.

110. PIERD'HOUY. Sull' avanzamento muscolare. *Ann. di ottalm.*, vol. xv., 1, p. 94.

111. ROOSA, ST. J. The result of the operations for convergent squint. *Med. News*, vol. xlviii., 6.

112. DE ST. GERMAIN, L. A., et VALUDE. Traitement du strabisme. *Rev. mens. des malad. de l'enfance*, Jan., 1886, p. 25.

BERRY (100) reports a case of divergent strabismus with homonymous diplopia. The strabismus had existed for several years, but the diplopia had begun to manifest itself only nine months ago in consequence of exhaustion. The external rectus was divided and the internal rectus advanced. Although the visual axes were now parallel, the homonymous diplopia was increased. This condition must be ascribed to paresis of the abducens, the result of exhaustion and catching cold. Of course the homonymous diplopia was increased by the operation.

DU BOIS REYMOND (101) describes the method devised by Hirschberg of measuring the degree of strabismus on the perimeter by the corneal reflex.

According to FROST (102) most cases of convergent strabismus are due to hypermetropia. If the children are given the proper convex glasses when they begin to squint, the eyes, in most cases, become straight again. The result is certain, when the strabismus diminishes or disappears entirely after the instillation of atropine and the paralysis of accommodation is complete. Where glasses cannot be worn and an operation cannot be performed on account of the youth of the patient, the eye which does not squint should

be covered for a few hours every day, so that it may not become amblyopic.

GILLET DE GRANDMONT (103) reports a case of diminished power of fusion as the cause of strabismus. MARCKWORT.

HIRSCHBERG (104) determines the deviation of the squinting eye according to a method similar to that of Landolt (*cf.* "Gräfe-Sämisch's Handbook," vol. iii., p. 235), from the position of the reflex image of the cornea in that eye. He assumes five principal groups. The first includes the cases in which the corneal reflex is seen materially nearer the centre of the pupil than the pupillary margin of the squinting eye—where there is, therefore, a squint of 5–6°. In such cases an operation is generally not indicated. The second group includes the cases in which the corneal reflex is seen at the edge of the pupil of medium width, corresponding to a strabismus of about 12–15°. In such cases the simple division of the muscle is indicated. In the third group the corneal reflex appears beyond the margin of the pupil of medium width, corresponding to a strabismus of about 25°. In such cases the division of the shortened muscle and the moderate advancement of its antagonist are indicated. In the fourth group the corneal reflex appears at or near the corneal margin, corresponding to a strabismus of 45–50°. There must be a decided advancement in such cases, followed, if necessary, by division of the corresponding muscle of the other eye. The fifth group includes all the higher degrees of strabismus, 60–80°. In such cases the combined operation should be done on both eyes. The author performed 84 operations in 1885, according to the rules herein laid down, 37 of them being simple divisions, and 47 divisions combined with advancement.

According to JAVAL (105) muscular insufficiency exists only as the result of an erroneous diagnosis, as it completely disappears when the refraction is properly corrected. MARCKWORT.

LANDOLT (107) discusses tenotomy in muscular insufficiency.

PIERD'HOUY (110) discusses the indications for advancement, and describes a few small changes which he introduced into the technique of the operation. DANTONE.

The best period of life for operation ROOSA (111) thinks to be from the fifth to the seventh year. As regards the improvement in vision after the operation he has found it considerable, and thinks it due, when present, not to the operation, but to the letting up of the spasm of accommodation. This opinion is founded

upon a table of 168 tenotomies for convergent strabismus which accompanies the paper. He therefore is no believer in amblyopia ex anopsia. BURNETT.

113. BERRY, G. A. On bilateral abducens paralysis. *Ophth. Rev.*, vol. v., No. 52, p. 33.

114. BLANC, E. Étude sur le diagnostic du siège des lésions dans les paralysies oculomotrices. *Arch. d'ophth.*, vol. vi., 3, p. 243.

115. EMERSON, J. B. Statistics illustrating the etiology of paralysis of the ocular muscles. *N. Y. Med. Jour.*, 1886, p. 520.

116. GALEZOWSKI. Des paralysies des nerfs moteurs de l'œil et de leur traitement par le bromhydrate de pelletièrine. *Rec. d'ophth.*, 1886, No. 3, p. 141.

117. LUCANUS. Ophthalmoplegia externa congenita. *Zehender's klin. Monatsbl. f. Augenhk.*, vol. xxiv., p. 271.

118. PARINAUD et MARIE. Névralgie et paralysie oculaire à retour périodique constituant un syndrome clinique special. *Arch. de névrologie*, Jan. 15, 1886.

119. RAMPOLDI. Due casi di affezione dolorosa del 5° paio guariti radicalmente collo strappo cruento del nervo, *Ann. di ottalm.*, vol. xiv., 5–6.

120. RAMPOLDI. Un nuovo caso di congenito squilibrio motorio oculo-palpebrale. *Ann. di ottalm.*, vol. xv., 1, p. 54.

121. REMAK, B. One hundred cases of post-diphtheritic paralysis of ocular muscles. *Centralbl. f. prakt. Augenhk.*, 1886, p. 161.

122. ROSENMEYER. On diphtheritic disturbances of vision. *Wiener med. Wochenschr.*, 1886, No. 13.

123. STRÜMPELL, A. On a case of progressive ophthalmoplegia. *Neurol. Centralbl.*, 1886, No. 2.

124. SUCKLING. Ophthalmoplegia. *Brit. Med. Jour.*, 1886, No. 1326, p. 245.

125. WALDMAN, P. B. Ophthalmoplegia externa. *Amer. Jour. Ophth.*, 1886, No. 4.

126. WERNER, L. Diplopia in paralysis of the superior and inferior recti and obliqui muscles. *Ophth. Rec.*, vol. v., No. 53, p. 65.

BERRY (113) found that while the ordinary convergent strabismus does not develop before the second or third year, paralytic

convergent strabismus is observed in the first months. The paralysis is seldom complete, and generally of peripheric origin. He reports three cases.

BLANC (114) treats in a lucid manner the subject of localizing paralysis of the ocular muscles. He divides them into orbital, basilar, intrapeduncular, nuclear, and cerebral paralyses. On the basis of the anatomical arrangement of the ocular muscles, and their relations to other nerves, and keeping in view the results of experimental physiology and clinical observation, the author describes different forms of paralysis, and shows how it is possible to localize an affected area from the combination of the absence of single symptoms or whole groups, either on the part of the ocular muscles alone, or in combination with disturbances in other nervous departments. v. MITTELSTADT.

EMERSON (115) found among 36 pareses of the third nerve, 27.7 % giving a history of syphilis ; among 23 of the sixth nerve, 76 % of syphilitic origin ; 3 of the fourth nerve were due to syphilis, and 2 cases of ophthalmoplegia externa. BURNETT.

GALEZOWSKI (116) cured cases of ocular paralysis with hydrobromate of pelletièrine (1:120, one tablespoonful every 4–5 hours). Five clinical histories. The remedy failed in paralysis of the ciliary muscle and in paralysis due to tabes. MARCKWORT.

LUCANUS (117) observed congenital paralysis of both external recti in an otherwise healthy girl nine years old. The internal and superior recti, the inferior oblique, and levator palpebrarum were also paralyzed, but the inferior rectus, superior oblique, sphincter iridis, and tensor choroideæ were not affected.

PARINAUD (118) reports the case of a woman, aged twenty-six, who suffers every spring, since about her sixth year, from orbital neuralgia and temporary paralysis of the ocular muscles. The attacks increase in intensity for five or six days, continue at the same height for a week, and then gradually diminish and disappear, only to return after two months. MARCKWORT.

RAMPOLDI (119) tore the infratrochlearis with good results in a case of severe neuralgia, due to a cicatrix near the inner canthus. The detachment of the scar was twice performed, and was followed by an annoying nervous moaning which lasted for more than two months, but the neuralgia did not return. In another case of severe infraorbital pains the tearing of the nerve effected an instantaneous and permanent cure.

RAMPOLDI (120) describes a congenital disturbance of motility

in the territory of the oculomotor nerve, observed in the left eye of a boy, aged seven. Ordinarily the upper lids sink down and the eye is turned outwards, but from time to time twitchings of the inactive muscles are observed, which can increase to such an extent as to completely open and straighten the eye. The pupil is somewhat dilated, and becomes smaller when efforts are made to bring the eye into the proper position. The eye can be rotated upwards only with difficulty, but its function is not affected.

DANTONE.

REMAK (121) and ROSENMEYER (122) report cases of paresis of accommodation after diphtheria. The sphincter of the iris was never affected, neither was optic neuritis found in any case.

STRÜMPELL (123) describes a case of binocular progressive ophthalmoplegia, which had been gradually developing for twenty-five years, but which for several years has remained stationary. There was ptosis in both eyes, the eyeballs were almost immovable, the pupils of medium width and responsive to light, the accommodation was paralyzed, but there was no diplopia. Every thing else was normal.

SUCKLING (124) reports almost complete paralysis of both oculomotor and of the abducens nerves in a man, aged sixty-seven, after a cold. The accommodation was not affected. In other respects the eyes were normal. Recovery after the use of iodide of potash.

WALDMAN (125) saw paralysis of the third nerve, supplying the exterior muscles of the eye, come on in one night. Under hypodermic injections of strychnine, increasing from $\frac{1}{40}$ to $\frac{1}{6}$ gr., a perfect recovery took place. (Insufficient report.) BURNETT.

## X.—ORBIT AND NEIGHBORING CAVITIES.

127. BERGER, E., and TYRMAN, J. The diseases of the sphenoid cavity and of the labyrinth of the ethmoid bone, and their relations to affections of the eye. Wiesbaden, 1886: J. F. Bergmann.

128. DEEREN. Exophthalmie double due à une myélite aiguë circonscrite. *Rec. d'ophth.*, 1886, No. 6, p. 337.

129. DELENS, E. Observation de tumeurs lymphadéniques des deux orbites. *Arch. d'ophth.*, vol. vi., 2, p. 154.

130. DOLSCHENKOW. Tumor cavernosus orbitæ sinistræ. *Wjestnik ophth.*, vol. iii., 1, p. 34.

131. DRAKE-BROCKMANN, E. F. Two cases of retro-ocular tumor. *Ophth. Rev.*, vol. v., No. 51, p. 8.

132. GAYET. Sur les tumeurs symmétriques des deux orbites et leur caractère symptomatique. *Arch. d'ophth.*, 1886, vol. vi., 1, p. 15.

133. HIRSCHBERG, J., and BIRNBACHER, A. A case of rapidly growing malignant sarcoma of the orbit. *Centralbl. f. prakt. Augenhk.*, 1886, p. 65.

134. MACBURNEY. Orbital aneurism. *N. Y. Med. Journ.*, vol. xliii., No. 12, p. 133.

135. MOTAIS. Un cas remarquable d' exophthalmos. *Ann. d'ocul.*, vol. xcv., p. 47.

136. DE VINCENTIIS. Una seconda osservazione di mucocele o di ectasia del labirinto etmoidale, con operazione radicale. *Riv. internaz. di Med. e Chir.*, vol. iii., 2, p. 69.

BERGER and TYRMAN (127) have compiled the published cases of affections of the sphenoid cavity and of the labyrinth of the ethmoid bone in which an autopsy was made, and examined them in regard to their connection with affections of the eye. They found that as long as the inflammation or neoplasm is confined to the sphenoid cavity, there are either no subjective symptoms, or there is severe headache, occasionally of an intermittent character. When the surrounding tissues become affected, symptoms manifest themselves which point to the sphenoid bone as the seat of the affection. Caries and necrosis of the body of the sphenoid bone may produce sudden unilateral blindness combined with orbital phlegmon, but also gradual discharge of portions of the bone unattended by any visual disturbances, and followed finally by meningitis. Sometimes portions of the body of the sphenoid bone are suddenly discharged through the nose, fatal hemorrhages occur after perforation of the bony wall between the cavernous sinus and the sphenoid cavity, retropharyngeal abscesses, thrombosis of the sinus with thrombosis of the ophthalmic artery, due to thrombosis of the sinus circularis sellæ turcicæ, and perforation of the base of the body of the sphenoid bone without any symptoms. Tumors of the body of the sphenoid bone may produce amaurosis by compression of the optic nerve in the optic canal. The tumor may spread to the neighboring cavities—the orbit, the nasopharynx, the labyrinth of the ethmoid bone, and to the cranial cavity,—causing meningitis. In the bibliography twenty-three

cases are recorded in which amaurosis followed affections of the sphenoid bone in form of papillitis or atrophy of the optic nerve. After injuries of the body of the sphenoid bone dripping of the cerebro-spinal liquid, pulsating exophthalmus, amaurosis, and anæsthesia of the second and third branches of the fifth nerve have been observed. Inflammation of the labyrinth of the ethmoid bone may be followed by an orbital abscess and meningitis; caries also by an orbital abscess, orbital emphysema, discharge of portions of the ethmoid bone, and by meningitis; tumors of the labyrinth of the ethmoid bone give rise to the same symptoms as tumors which spring from the inner surface of the orbit. (This excellent monograph of 110 pages deserves to be read by every physician who pays attention to diseases of the head, eye, and nose.—K.)

DELENS (129) observed recovery from symmetrical orbital tumors in a man aged fifty-five, after he had been attacked by cholera. Tumors similar to those of the orbit were found in the hard palate, also swelling of the lymphatic glands in various parts of the body, and a marked increase of leucocytes. The spleen was not enlarged. In the very first days of the cholera a decided decrease of the orbital tumors was perceptible, and in two weeks they had entirely disappeared; also the neoplasms in the hard palate. The swelling of the glands was also much diminished.

V. MITTELSTÄDT.

DOLSCHENKOW (130) reports a case of cavernous tumor of the orbit. Patient twenty-one years old, perfectly healthy. In the upright position the left eye protrudes 8–9 *mm* in comparison with the right. $V = \frac{15}{15}$. Normal fundus, normal mobility. In the supine position the eye protrudes less, except when the internal jugular vein is compressed. When this vein is compressed in the upright position, the eyeball protrudes *ad maximum;* also when the breath is held. A slight blowing sound can be heard in the globe only when the breath is held. When the eyeball protrudes very much, vision becomes dim, and the patient feels pain and oppression. The left eye was said to have been injured fourteen years ago by a fall. The exophthalmus was first noticed seven years ago. Three years ago, during an attack of coughing, the eyeball first was dislocated. The author thinks the injury gave rise to the development of a cavernous tumor in the retrobulbar fatty tissue which surrounds the optic nerve within the pyramid of muscles.

HIRSCHMANN.

DRAKE-BROCKMANN (131) reports two cases of retrobulbar tumor. The first was observed in the left eye of a man aged twenty-five. There was marked proptosis, due to a somewhat elastic tumor at the inner edge of the orbit. As syphilis was probably the cause, he improved under the application of inunctions. The second case was that of a child aged five, whose blind left eye had been protruding since birth. After enucleation a tumor 2″ long was found springing from the optic nerve, which ended about $\frac{1}{3}$‴ from the entrance of the optic nerve into the globe. It proved to be a fibroma.

In a man aged seventy GAYET (132) observed exophthalmus, which first showed itself in the right eye two years ago, and in the left four months ago; in the latter eye it was much more marked. The left eye is pushed downwards, forwards, and outwards by a tumor the size of a small apple directly beneath the upper lid. It is worthy of note that at times the tumor greatly decreased in size, and once even seemed to disappear entirely. Both eyes are immovable. V good; no changes in fundus. The patient suddenly became ill, and died in two days. As death was attributed to double pleurisy, the other organs were not examined. The following condition was found in the orbits: The tumor, which proved to be a lymphadenoma, filled the whole upper part of the orbit, and extended from the optic foramen to the upper lid, surrounded the posterior part of the globe, extended to the optic nerve, leaving its sheath intact, and then extended inwards and outwards towards the floor of the orbit, affecting the nerves, muscles, and blood-vessels. For details see the original. The author thinks the neoplasm originated in the fatty tissue, and assumes a previous œdematous condition of the connective tissue, which would also explain the variations in size of the tumor of the left side. He adds his case to the analogous ones of O. Becker, Leber, Osterwald, and Reymond, and regrets that during life the blood, and at the autopsy the other organs, were not examined. Leucæmic changes would probably have been found in this case also, which must always be thought of in symmetrical orbital tumors. v. MITTELSTÄDT.

HIRSCHBERG and BIRNBACHER (133) report a case of complete exenteration of the orbit in a girl aged eight, on account of a retro-ocular sarcoma. A relapse occurred a few months later, metastatic tumors developed, and the child died.

MOTAIS (135) reports a case of exophthalmus which has not

been quite satisfactorily explained. A woman, forty-three years old, after a slight illness of two or three weeks, was attacked with severe headache and fever on July 21st, and remained unconscious for twenty-four hours. When she recovered consciousness, so high a degree of exophthalmus of the right eye was discovered, that complete dislocation of the globe followed the separation of the lids. The cerebral symptoms had entirely disappeared. Neuro-retinitis developed in the hitherto healthy left eye on August 15th and 16th. On September 3d the patient had an attack similar to that of July 21st; unconsciousness, however, lasted for only two hours, and was followed by exophthalmus of the left eye instead of the right. The exophthalmus gradually disappeared, and was succeeded by atrophy of the optic nerve of the left eye. Since then four years have passed without an attack.

MARCKWORT.

137. ALT, A. Eight enucleations of panophthalmitic eyeballs. No antisepsis. No panophthalmitis. *Amer. Jour. Ophth.*, June, 1886.

138. DOR. Les cas de mort après énucléation. *Soc. franç. d'ophth.*, April 27, 1886.

139. HOBBY, C. M. Enucleation in panophthalmitis with a fatal case. *Amer. Jour. Ophth.*, 1886, vol. iii., No. 6, p. 141.

140. NETTLESHIP. Meningitis after enucleation. *Ophth. Soc. Unit. Kingd.*, Jan. 28, 1886.

141. DE WECKER, L. L'antisepsie comme moyen preventif des dangers de mort après les opérations orbitaires. *Ann. d'ocul.*, vol. xcv., p. 55.

ALT (137) thinks the danger from enucleation of eyes suffering from panophthalmitis is greatly overrated. BURNETT.

DOR (138) saw death in two cases after enucleation. In the first case the meningitis had developed in a tuberculous patient six weeks after the operation. In the other case the patient was well five days after the enucleation, and died of embolism, or apoplexy, or sublimate-poisoning, in two days. In view of the circumstance Gayet asks whether there was any direct connection. Chevallereau reports the case of a boy aged nine, who, six weeks after the enucleation, was attacked with meningitis. He also was tuberculous. Dransart never saw death follow enucleation. Galezowski only twice among the large number he has made.

MARCKWORT.

HOBBY (139) reports a case in which the panophthalmitis was due to injury from a stone. On the fourth day after the enucleation there was death preceded by delirium and coma (meningitis). No post-mortem. BURNETT.

NETTLESHIP (140) has compiled twenty-eight cases in which death from purulent meningitis followed enucleation. In eighteen an autopsy was made, which confirmed the diagnosis in every case. He seeks the cause in infection of the wound, and believes that free drainage of the orbit can prevent such a result.

Referring to Deutschmann's paper "On purulent meningitis after enucleation" (*cf. Arch. f. Ophth.*, vol. xxxi., p. 251), WECKER (141) calls attention to the urgent necessity of thorough disinfection in operations in the orbit. Aside from the disinfection of the instruments, etc., the silk thread used for suturing the conjunctiva is placed for twenty-four hours in a mixture of glycerine, alcohol, and salicylic acid, and then for some time in a sublimate solution (1 : 2500). This solution is also brushed into the eye, not only before the application of the thread, but also before and after tying it. No suture, however, is applied in enucleation of an eye affected with hemorrhagic glaucoma, on account of the secondary hemorrhage which frequently occurs. Wecker recommends exenteration of the globe. MARCKWORT.

142. HACK. The operative treatment of Basedow's disease. *Deutsche med Wochenschr.*, 1886, No. 25.

143. MAHER, W. O. Morbus Basedowii. *Ophth. Soc. Unit. Kingd.*, June 8, 1886.

144. WAEHNER, C. Contribution to the pathological anatomy of Basedow's disease. Berlin and Neuwied, 1886.

145. WILD, ROBERT. Exophthalmic goitre : family predisposition. *Brit. Med. Journ.*, 1886, vol. i., p. 1021.

In a girl aged 17, HACK (142) saw exophthalmus develop combined with enlargement of the left lobe of the thyroid gland. She also complained of darting pains in the region of the heart and of palpitations in every direction. Graefe's symptom was also observed. The patient had come to be treated on account of marked obturation of the nose. Hack found hyperplasia of high degree in the erectile tissue of the middle and lower turbinated bodies of both sides. After cauterizing the erectile tissue the exophthalmus almost entirely disappeared. Improvement continued, the palpitations ceased, and the thyroid gland decreased in size. A few months later the heart was found normal in every respect.

MAHER (143) saw the disease in a man aged 34. Both the exophthalmus and the goitre were confined to the right side.

WILD (145) reports that four members of a family, the mother and three daughters, were affected with morbus Basedowii.

## XI.—CONJUNCTIVA, CORNEA, SCLERA, ANTERIOR CHAMBER.

146. ALT, A. An epidemic of trachoma among the children of an orphan asylum. *Amer. Journ. Ophth.*, vol. iii., 2, p. 23.

147. ARMAIGNAC. Note sur un cas de conjonctivite blennorrhagique séro-vasculaire bénigne spontanée. *Rev. clin. d'ocul.*, 1886, No. 1, p. 1.

148. ARMAIGNAC. Sur les nævi de l'œil et des parties voisines. *Rev. clin. d'ocul.*, 1886, Nos. 3 and 4, pp. 73 and 97.

149. BÖGEL, G. The subconjunctival lipoma and its combination with ichthyosis hystrix. *Graefe's Arch. f. Ophth.*, vol. xxxii., 1, p. 129.

150. BRAILEY, W. Essential shrinking of the conjunctiva. *Ophth. Soc. Unit. Kingd.*, Jan. 28, 1886.

151. BURCHARDT. On diphtheritic conjunctivitis. *Charité Ann.*, 1886.

152. CRITCHETT and JULER. Essential shrinking of the conjunctiva. *Ophth. Soc. Unit. Kingd.*, Jan. 28, 1886.

153. DARRIER. Traitement de la conjonctivite granuleuse. *Soc. franç. d'ophth.*, 1886, April 29th.

154. DERBY, R. H. Contagious eye-troubles in asylums in New York and vicinity. *N. Y. Med. Journ.*, vol. xliii., No. 6.

155. FIEUZAL. Des cautérisations au jus de citron. *Bull. de la clin. nat. ophth.*, vol. vi., No. 2, p. 57.

156. FUCHS, E. Tuberculosis of the conjunctiva. *Wiener med. Presse*, 1886, No. 15.

157. GIFFORD, H. The occurrence of micro-organisms in conjunctivitis eczematosa and other conditions of the conjunctiva and cornea. These ARCH., vol. xv., p. 180.

158. GRADLE, A. Certain periodic affections of the conjunctiva allied to hay-fever. *Amer. Journ. Med. Sci.*, April, 1886.

159. GROISCZ, B. Panophthalmitis due to an operation for pterygium. *Szemeszet*, 1886, No. 1.

160. KALTENBACH. The prophylaxis of ophthalmo-blennorrhœa neonatorum. *Münchener med. Wochenschr.*, 1886, No. 26.

161. KAMOCKI. Contribution to the knowledge of the hyaline inflammation of the conjunctiva. *Centralbl. f. prakt. Augenhk.*, 1886, p. 68.

162. LESCYNSKY, W. M. Leucorrhœa as the cause of a recent epidemic of purulent ophthalmia in one of our city charitable institutions. *N. Y. Med. Journ.*, vol. xliii., No. 13, p. 352.

163. MARTIN. Note sur un cas de conjonctivite rhumatismale. *Journ. des sci. méd. de Lille*, Jan. 2, 1886.

164. MICHEL. The micro-organism of the so-called Egyptian ophthalmia. These ARCHIV., vol. xv., p. 452.

165. RAMPOLDI. Granuloma ulcerato o ulcera tubercolare della congiuntiva. *Ann. di ottalm.*, vol. xv., 1, p. 60.

166. RHEIN, P. On primary tuberculosis of the conjunctiva. *Münchener med. Wochenschr.*, 1886, Nos. 13 and 14.

167. SMITH, G. M. Contagious eye-diseases in public institutions. *N. Y. Med. Journ.*, vol. xliii., No. 6.

168. TROUSSEAU, A. La conjonctivite blennorrhagique spontanée sans inoculation. *Rev. clin. d'ocul.*, 1886, No. 3, p. 61.

169. TROUSSEAU. La conjonctivite chrysophanique. *Rev. clin. d'ocul.*, 1886, No. 5, p. 105.

170. DE WECKER. Un dernier mot sur le jequirity. *Rev. clin. d'ocul.*, 1886, No. 4, p. 87.

171. WESTHOFF. Trachoom-Behandeling. *Weekblad van het Nederl. Tijdschrift voor Geneesk.*, 1886, p. 549.

172. WOLFRING. Report on the pathologico-anatomical changes in the contagious inflammation of the conjunctiva. *Wjestnik ophth.*, vol. iii., 1, p. 78.

173. ZIEM. The simultaneous occurrence of trachoma and of catarrhs of the nasal mucous membrane. *Allg. med. Centralztg.*, 1886, Nos. 20 and 23.

ALT (146) reports that, of the sixty-three children in the institution, forty-three had trachoma, which could be directly traced to a case of the disease which had been admitted some seven months before. They were treated with sulphate of copper, yellow oxide of mercury, and atropine, when needed, with almost uniformly good results. BURNETT.

ARMAIGNAC (147) reports a case of benign conjunctivitis as it occurs in gonorrhœa and especially in rheumatism of the joints caused by the latter. In Armaignac's case, goutte militaire had

existed for twenty years without any affection of the joints. According to Fournier (*cf. Gaz. des hôp.*, 1885), this form of conjunctivitis is almost pathognomonic of the disease in question. It is marked by serous chemosis and vascularization of the whole conjunctiva; sometimes only the palpebral or ocular conjunctiva is affected. The absence of the symptoms usually attending conjunctivitis is peculiar; lachrymation, photophobia, pain, etc. The course is favorable, the treatment expectant, at least very mild. To prevent it the gonorrhœa must be treated.

v. MITTELSTÄDT.

In a case observed by ARMAIGNAC (148) there was a tumor at the upper outer part of the conjunctiva. There was no appreciable change in six years. In another case there was a vascular nævus on the conjunctiva near the caruncle. Removal; recovery.

v. MITTELSTÄDT.

After describing two cases of subconjunctival lipoma, which were removed and were remarkable on account of the hyperplasia of the fat and glands, BÖGEL (149) calls such tumors teratoid tumors, and divides them into two groups—those which appear in the usual form of dermoids, and those which, besides epithelial and cuticular connective tissue, contain hyperplastic masses of fat, interspersed with nerves and glands.

BRAILEY (150) describes a case of essential shrinking of the conjunctiva greatly resembling pemphigus, though the existence of the latter could not be shown.

BURCHARDT (151) observed in 1884 and 1885 twelve cases of diphtheria of the throat and lids. Sharply defined white masses spreading over the surface of the conjunctiva were found near the edges of the lids, and extended deep into the epithelium. The lids were frequently only slightly swollen; they were never stiff. Of the twelve patients four died of diphtheria of other parts. No scars remained in any case; in five cases corneal ulcers developed after the children had recovered, in four of which the ulcers did not perforate. This complication occurred in three of the four that died. The conjunctival affection was treated with applications of sublimate (1:1000), the corneal ulcers with the galvano-cautery.

CRITCHETT and JULER (152) also report two cases of essential shrinking of the conjunctiva.

In trachoma DARRIER (153) recommends the alternate application of chromic acid and sulphate of copper. Galezowski reports that Richet used chromic acid in 1868, but gave it up on account

of the deep scars it produced. Warlomont shows that chromic acid was used for this purpose as early as 1858. (Hairion: De l'emploi de l'acide chromique dans certains cas déterminés de l'ophthalmie granuleuse. *Ann. d'ocul.*, vol. xxxix., p. 213.) Sédan and Galezowski recommend excision of the fornix. Chibret and Poncet call attention to the fact that the disease differs in different countries. Wicherkiewicz cauterizes every three or four days with sublimate (1:100). Dehenne treats almost all his patients with the thermo-cautery. (It is worthy of note that, in contrast with the proceedings of former years, nobody at the French Ophthalmological Congress recommended jequirity this year.—Rev.) MARCKWORT.

DERBY (154) reports that in St. Patrick's Orphan Asylum in New York 203 among 409 girls suffered with contagious ocular affections, among 357 boys 105, in the Deborah Educational Institute 50 children among 223; in the St. Joseph's Home 22 % had chronic blennorrhœa; in the Nursery and Children's Hospital 178 among 461 had ocular affections, in the Mission of the Immaculate Virgin 127 among 372 boys, in the Catholic Protectory 871 among 2,137 boys, etc. The cause lay in the fact that the children affected with eye-troubles were not separated from the rest.

In pseudo-membranous or true diphtheritic conjunctivitis FIEUZAL (155) recommends the simultaneous application of lemon-juice and nitrate of silver in the following manner: A brush dipped in lemon-juice just pressed out is passed over the spots covered with the false or true diphtheritic membranes. A few minutes later Fieuzal washes the conjunctiva with lukewarm water, and then with the same brush, now dipped into a 2 % solution of nitrate of silver, touches the spots thus far not affected. Teillais washes with lemon-juice and covers the conjunctiva with iodoform. Galezowski uses oleum cadini (1:10). Manolescu saw paralysis of the right arm after true diphtheritic conjunctivitis. Poncet attaches most importance to frequent cleansing. Juler uses an ointment of yellow precipitate in such cases. MARCKWORT.

FUCHS (156) found in the lower fornix of a boy, aged ten, granualtions and small tumors in the tarsal portion, in which tubercle bacilli were found.

In conjunctivitis eczematosa GIFFORD (157) found seven different kinds of microbes, four of which proved pathogenic. He never succeeded, however, in producing phlyctenulæ by introducing the microbes into the conjunctival sac of the rabbits.

GRADLE (158) describes in full four cases of periodic disease of the conjunctiva allied to hay-fever. It would appear from a description of the appearances and symptoms that they were cases of spring catarrh without the marked circumcorneal changes which are usually met with. Such instances are reported by Vetch, and are not infrequent. BURNETT.

KALTENBACH (160) no longer uses Credé's method to prevent blennorrhœa neonatorum. During labor he washes out the vagina frequently with a sublimate solution, and after the child has been born simply washes the eyes with distilled water. In this manner he has obtained equally good results as with Credé's method. Its advantage lies in its simplicity and the absence of irritation, artificial conjunctivitis being avoided.

KAMOCKI (161) examined pieces of conjunctiva affected with hyaline degeneration, and reports the results.

MARTIN (163) relates the case of a woman who during an attack of acute rheumatism of the joints became affected with acute conjunctivitis accompanied by marked chemosis, at first in the right eye, afterwards in the left. She was treated with hot applications and salicylate of soda given internally, and recovered in a month. MARCKWORT.

In a young man, who soon afterwards died of tuberculosis, RAMPOLDI (165) operated upon an extensive ulcer of the conjunctiva of the upper lid, which everybody would have considered tuberculous. Nevertheless the microscope proved it to be a granuloma, without a trace of giant cells or tubercle bacilli. DANTONE.

RHEIN (166) observed four cases of tuberculosis of the conjunctiva in girls between the ages of fourteen and twenty. The palpebral conjunctiva was covered with a large number of grayish-yellow nodules. There he also found ulcers with a lardaceous floor. None of the girls had general tuberculosis; in one the nasal mucous membrane and skin were affected. The introduction of the nodules into the anterior chamber of rabbits' eyes caused tuberculosis of the iris, in some of the animals also tuberculosis of the lungs.

TROUSSEAU (168) also agrees with Haltenhoff and Fournier, that there is a conjunctivitis characteristic of gonorrhœa, and reports a similar case to that of Armaignac. v. MITTELSTÄDT.

TROUSSEAU (169) saw a peculiar kind of conjunctivitis in patients who had been treated for psoriasis with chrysophanic

acid ; from 4 to 5 per cent. of the patients treated were thus affected in from twelve to twenty-four hours after the application.

MARCKWORT.

DE WECKER (170) desires to leave the decision as to the value of the jequirity treatment to others who have a larger number of trachoma cases under their care, as he has attained his aim—the substitution of jequirity for inoculation with blennorrhoic pus.

v. MITTELSTÄDT.

WESTHOFF (171) did not succeed in cultivating the trachoma-coccus either on meat peptone-gelatine or on meat peptone-agar-agar. In treating trachoma he instilled a 5 % solution of cocaine, and brushed the lids with a solution of nitrate of silver, with sulphate of copper and crude alum.

WOLFRING (172) believes the main cause of the acute infectious catarrh to be swelling of the acino-tubular glands and their surroundings.

ZIEM (173) thinks that affections of the conjunctiva are frequently due to nasal troubles. Retention of the tears causes catarrh of the lids, making the diseased conjunctiva more susceptible to the contagium of trachoma suspended in the air (?—Rev.) than the healthy conjunctiva.

174. AYRES, S. C. Incrustation of lime on the cornea. *Amer. Journ. Ophth.*, 1886, No. 1.

175. BERRY, T. A. On the non-operative treatment of serpiginous hypopyon corneal ulcer. *Ophth. Rev.*, 1886, No. 58, p. 357.

176. DANTZIGER, C. The treatment of corneal opacities by massage of the eye. *Deutsche Medicinalztg.*, 1886, No. 7.

177. DOLSCHENKOW. Keratitis superficialisa vasculosa. *Wjestnik ophthalm.*, 1886, No. 2, p. 123.

178. EVERSBUSCH, O. The application of the thermo-cautery in destructive corneal processes. *Zehender's klin. Monatsbl. f. Augenhk.*, xxiv., p. 88.

179. GALEZOWSKI. Du traitement du staphylome conique de la cornée par l'excision d'un lambeau sémilunaire de la cornée. *Rec. d'ophth.*, 1886, No. 6 ; *Gaz. des hôp.*, 1886, No. 69.

180. GRADENIGO. Lettera aperta al Chiari. Dr. Rosmini. *Boll. d'ocul.*, vol. viii., 10.

181. HUBERT. Des taches de la cornée et leur traitement. *Soc. franç. d'ophth.*, April 28, 1886.

182. INOUYE. De la sclérotomie modifiée dans le cas de sta-

phylome naissant de la cornée avec prolapsus persistant de l'iris. *Rev. gén. d'ophth.*, 1886, p. 97.

183. PONCET. Sur les granulations de la cornée. *Soc. franç. d'ophth.*, Apr. 29, 1886.

184. RAMPOLDI. Ancora due casi di congestione linfatica oculare. *Ann. di ottalm.*, vol. xv., 1, p. 56.

185. ROLLAND. Kératite sympathique consécutive à la destruction d'un œil par traumatisme chez un individu vigoureux et sans diathèse. *Rec. d'ophth.*, 1886, No. 3, p. 137.

186. THOMPSON, J. W. Corneal ulcers. *Journ. Amer. Med. Assoc.*, June 19, 1886.

AYRES (174) observed incrustation of lime on the cornea. After its removal with the knife the cornea became entirely transparent. BURNETT.

DANTZIGER (176) recommends Heisrath's method of clearing up corneal opacities by massage. The treatment lasted for about two months, the patient being treated daily for about half a minute. In ten cases he had good results.

DOLSCHENKOW (177) observed protracted and frequently recurrent formation of nodules and vesicles in epithelium of the cornea, combined with scaling, and attended with severe, frequently returning pain. The disease lasted four years in the left eye, leaving a thin, superficial opacity. In the right eye the disease began six months after it had ceased in the left, and has already lasted two years and a half. Treatment utterly fails. Shortly before the disease began, the patient, at that time forty-two years old, had completely lost her menses after a wetting she received. The author thinks the disease is of a parasitic nature. (It seems to be a recurrent herpes ophthalmicus zoster.—Rev.) HIRSCHMANN.

In destructive corneal affections EVERSBUSCH (178) recommends the thermo-cautery devised by himself. He claims that it is preferable to the galvano-cautery, as it never fails to act.

In cases of staphyloma pellucidum GALEZOWSKI (179) recommends excision of a small semilunar horizontal flap over the visual axis; it should be 4–5 *mm* long, and in the middle 2–3 *mm* wide. After the operation eserine is instilled and a bandage applied, which is not removed for eight days. MARCKWORT.

GRADENIGO's (180) method consists in making a crucial incision through the leucoma, and inserting a small glass tube, 7–8 *mm* long, into the opening thus made, the tube being attached to the

concave surface of an artificial eye where the pupil is situated. The amount of sight obtained is sometimes remarkable, though of course it does not last for more than four or five days; in one case the patient could even read No. 2 of Wecker's test-types.

DANTONE.

In corneal opacities, cicatricial as well as sclerosed, HUBERT (181) recommends the application of bipolar electrolysis, and describes the instrument at length. Prouff has operated three times, according to Hubert's method, with very good success.

MARCKWORT.

INOUYE (182) performs a peculiar kind of sclerotomy in beginning extensive staphylomas of the cornea with prolapse of iris. Graefe's knife is passed into the cornea about one *mm* from the edge, as far as possible from the free place. The point of the knife is turned towards the ciliary body; the counter-puncture is made in the sclera one *mm* from the corneal margin, the section being made about 6 or 7 *mm* long and cutting the corneal margin under an angle of about 20°. The wound is opened twice daily until the cornea flattens. Afterwards an optical iridectomy follows. He reports four cases. MARCKWORT.

PONCET (183) made an anatomical examination of an eye which had been affected with granulations of the cornea; it had been enucleated by Dehenne, on account of severe complications. The micrococci were found not only in the cornea, but also in the iris and ciliary body. MARCKWORT.

RAMPOLDI (184) describes two more cases of lymphatic infiltration of the cornea, which came on when the head was inclined forwards for a few minutes, and disappeared under the eyes of the observer when the head was held erect again. DANTONE.

ROLLAND (185) reports a case of sympathetic keratitis: Infiltration of the whole cornea, especially of the lower inner quadrant, superficial ulceration, marked conjunctival injection. $V = \frac{1}{8}$. Recovery without any treatment in ten days after the exciting stump had been removed. MARCKWORT.

THOMPSON (186) thinks, from his experience, that the use of alum as an astringent in conjunctivitis leads to ulcerations of the cornea as a complication. BURNETT.

187. ADDARIO. Su di un caso di melano-sarcoma espisclerale e sulla formazione della melanina ne' tumori. *Ann. di ottalm.* vol. xiv., 5, 6.

ADDARIO (187) describes a melano-sarcoma which, springing

from the episcleral tissue of the left eye, had produced metastases in most organs of the body. DANTONE.

188. GUAITA. Di alcune inesplorate virtu terapeutiche della cocaina in ottalmojatrica. *Ann. di ottalm.*, vol. xiv., 5, 6.

189. PFLÜGER. Pathological and physiological action of cocaine, movement of the iris, mydriatic action of atropine. *Zeh. klin. Monatsbl. f. Augenhk.*, vol. xxiv., p. 169.

890. SCHUBERT. A case of cocaine-intoxication. *Centralbl. f. prakt. Augenhk.*, 1886, p. 17.

191. WILLIAMS, R. Case of cysticercus in the anterior chamber. *Lancet*, 1886, vol i., p. 102.

192. WOOD-WHITE. Ill effects of cocaine. *Ophth. Rev.*, Jan., 1886, p. 6.

193. WÜRDINGER L. Experimental and anatomical investigations of the action of cocaine on the cornea. *Münchener med. Wochenschr.*, 1886, Nos. 8 and 9.

GUAITA (188) finds that in consequence of the relaxation of the recti muscles, which may be increased to hypotony, cocaine diminishes the probability of the escape of vitreous in cataract-extraction, and permits therefore the frequent introduction of instruments. For the same reason the remedy is recommended in squint-operations, especially in advancement or when too great an effect has been produced by simple division. As it diminishes the tension, it is indicated in glaucoma, and on account of its mydriatic and anæsthetic properties it should be used in connection with atropine in iritis, in irido-cyclitis, and in sympathetic ophthalmia, in inflammations of the conjunctiva and cornea accompanied with pain and photophobia, and in injuries and contusions of the globe. The author has never seen any of the evil results mentioned by other observers, except the slight exophthalmus and the retraction of the lids; the latter might interfere with the manœuvres with the lids in cataract-extraction. Both effects can be prevented, when the strength of the remedy and the number of instillations are not exaggerated. DANTONE.

PFLÜGER (189) describes two kinds of opacity of the cornea due to cocaine. One begins at the edge of the operative wound, spreads into the corneal tissue, and is harmless, disappearing in one or two weeks. It is probably due to a deposit produced by the cocaine in the lymph. The other is attended with long-continued diminished tension and anæsthesia of the cornea, vesi-

cles continue to form with great persistence, and the cornea has but a slight tendency to clear up.

SCHUBERT (190) reports that the subcutaneous injection of six drops of a 20 % solution of cocaine for the removal of a carious tooth was followed by obscuration of vision and unconsciousness lasting for some time. Consciousness soon returned after inhalation of a few drops of nitrite of amyl, and vision also was restored.

WOOD-WHITE (192) attributes the corneal opacity after instilling cocaine to the sublimate used besides, and therefore proposes to substitute boracic acid for the latter.

For the purpose of studying the corneal changes which occur after the instillation of cocaine, WÜRDINGER (193) repeatedly used a 5 % solution on rabbits' eyes. One eye was kept closed, the other open. A loss of epithelium invariably developed in the latter, which, by continuing the experiment, constantly grew larger and led to complete haziness of the cornea. The greater action was not produced by stronger solutions or more frequent instillations, but by the longer duration of the experiment and the greater length of time during which the eye was kept open. The author found that the corneal changes are due to evaporation and lymphatic anæmia of the cornea. He recommends the application of a guttapercha-sublimate bandage, continued for several days, to cut short a beginning cocaine-keratitis. As a prophylactic measure, he advises to first cleanse the eye with sublimate, and then begin with the instillations of cocaine. After each instillation the lids must be tightly closed to keep out the influence of the air, and a moist bandage should be applied until it is time to begin the operation.

## Sections XII.–XXI. reviewed by DR. NIEDEN.

Translation by A. SCHAPRINGER, M.D., New York.

### XII.—IRIS.

194. MORANO. Dell' uveite. *Ann. di ottalm.*, vol. xv., p. 76.

195. LAWRENTJEFF (St. Petersburg). On congenital anomalies of the iris. *Centralbl. f. Augenh.*, Bd. ix., p. 10.

196. VAN DUYSE. Contribution à l'étude des membranes pupillaires persistantes. With wood-cuts. *Annales d'ocul.*, 49, vol. xcv., 1 et 2 livraisons, Janv.–Févr., 1886, p. 13.

MORANO (194) found posterior synechiæ in four individuals

whose sight had only recently become affected, and in whom there were absolutely no symptoms of parenchymatous iritis or iridocyclitis, the inflammatory process having been confined to the pigmentary layer of the iris. M. calls this affection uveitis, and believes that it is produced by straining the accommodation in a sitting posture. DANTONE.

LAWRENTJEFF (195) describes a case of congenital total irideremia of both eyes, with stellate cataract and fœtal ring of the cornea, in a man aged thirty-eight years. The ciliary processes could not be seen. With a stenopæic slit S was $\frac{3}{100}$ and $\frac{10}{100}$. There was oscillatory nystagmus. L. has collected thirty analogous cases previously published, which show that the affection is often hereditary, sometimes reappearing in a number of generations. The lens was free from opacity in two cases only.

VAN DUYSE (196) describes four cases of persistent pupillary membrane, and discusses the different theories concerning its origin and the relation it bears to the iris. The details of the cases cannot be reproduced in this review. v. MITTELSTÄDT.

## XIII.—CHOROID.

197. TANSLEY, J. O. A case of acute localized choroiditis. *Am. Jour. of Ophth.*, March, 1886.

198. WARE, LYMAN. Ossification of the choroid. *Jour. Amer. Med. Assoc.*, Jan. 9, 1886.

199. HÄNSELL, PAUL. Sarcome du corps ciliaire. *Bull. de la clin. ophth. des Quinze-vingts*, vol. iv., No. 2, Avril–Juin, 1886, p. 64.

200. MANZ. Case of metastatic cancer of choroid. *Von Graefe's Arch. f. Ophth.*, vol. xxxi., 4, p. 101.

TANSLEY (197) had an opportunity of watching the development and progress of a case of central choroiditis of an acute character. It passed away in the course of five weeks, leaving vision normal. BURNETT.

In WARE'S (198) case the eye was lost from inflammation due to an injury eighteen years before enucleation was made. The bone surrounded the optic-nerve entrance, and occupied the place of the choroid. The shell was 15 *mm* in length, 8 *mm* in width. BURNETT.

HÄNSELL (199) publishes a case of sarcoma of the ciliary body occurring in a woman forty-eight years of age. Sclerotomy had

already been performed upon the eye by another practitioner on account of glaucomatous symptoms, and afterwards iridectomy by Fieuzal, whereupon the pain subsided. Three months later a nodule, the size of a grain of wheat, its surface resembling that of a raspberry, was discovered behind the coloboma. It grew rapidly, and necessitated enucleation. It was found that the sarcoma had originated in the connective tissue of the ciliary body. The cells of the sarcoma were derived partly from the cells of the pars ciliaris retinæ, thus proving that this structure belongs to the connective-tissue series, and partly from connective-tissue cells which had assumed embryonic forms. The latter cells were the result of genuine indirect segmentation which had taken place in the neighborhood of the blood-vessels, and probably in consequence of some irritation emanating from these vessels.

v. MITTELSTÄDT.

MANZ (200) describes a case of metastatic cancer of the choroid occurring in a woman fifty years of age, who suffered from a carcinoma of the left mammary gland. The choroid of the right eye became affected first, and afterwards also that of the other eye. Manz thinks that the affection travelled from one eye to the other by way of the optic nerves. There was no increase of tension.

To this paper of Manz, Leber adds a few remarks concerning the case of pigmented and very vascular nævus of the cheek, the extirpation of which was followed at the end of twelve months by the appearance of a malignant tumor of the choroid, which case was observed at the clinic of v. Graefe, in 1870. Leber refutes the objections of Fuchs, who does not recognize any connection between the nævus and the choroidal tumor, and quotes analogous cases observed by Schiess-Gemusens and Roth, in which the microscopic appearances also coincided with those found in the case of v. Graefe.

## XIV.—GLAUCOMA.

201. CROSTI. Sulla natura del glaucoma primitivo. *Giorn. med. del R. Eserc. e della R. Marina*, vol. xxxiv., 6, p. 656.

202. RAMPOLDI. Casi di intermittente ipotonia oculare. *Gazz. med. ital. lomb.*, vol. xlvi., 12.

203. LAKER, E. Experiments concerning glaucomatous excavation. *Zehender's klin. Monatsbl.*, May, 1886, p. 187.

204. HIRSCHBERG, J. On rainbow colors in glaucoma. *Deutsche med. Wochenschr.*, 1886, Nos. 3 and 4.

205. LUNDY, C. J. Glaucoma following the sting of a bee. *Amer. Jour. Ophth.*, May, 1886.

206. MARTIN, GEORGES. Des variations dans le degré et le sens de l'astigmatisme cornéen chez les glaucomateux. *Soc. franç. d'ophth.*, 1886, April 27th ; *Ann. d'ocul.*, vol. xcv., p. 207.

207. ARMAIGNAC, H. Traitement du glaucome par les instillations simultanées de cocaine et d'esérine. Observations. *Revue clin. d'ocul.*, 7, A., No. 6, June, 1886, p. 29.

208. RICHEY, S. O. A case of chronic simple glaucoma treated with eserine. *Chicago Med. Jour. and Exam.*, Dec., 1885.

209. PANAS. Dut traitement de certaines formes de glaucome sans opération. *France méd.*, 1886, p. 827.

210. LANDESBERG. The efficiency of sclerotomy in glaucoma. *v. Graefe's Arch. f. Ophth.*, Bd. xxxii., 1, p. 253.

211. GALEZOWSKI. Sur l' ophthalmotomie ou sclérochoriotomie postérieure. *Soc. franç. d'ophth.*, 1886, April 30th ; *Ann. d'ocul.*, vol. xcv., p. 231.

212. MASSELON. Sur le glaucome. *Soc. franç. d'ophth.*, 1886 ; *Ann. d'ocul.*, vol. xcv., p. 231.

213. LANDESBERG. Contribution to the knowledge of glaucoma. *Centr. f. Aug.*, Bd. x., p. 109.

214. JAVAL. Dangers de la cocaine dans le glaucome. *Progr. méd.*, 1886, p. 355.

CROSTI's (201) paper is an historical and critical essay on the theories concerning glaucoma which have been brought forward from the time of the invention of the ophthalmoscope up to the present date. He comes to the conclusion that the glaucomatous symptoms are caused by an irritation of the ciliary nerves causing spasmodic contraction of the arteries supplied by them.

DANTONE.

RAMPOLDI (202) reports five cases of inflammation of the cornea and iris, in which he observed an abnormally low degree of intraocular tension. The patients, four children and a youth of nineteen, were all delicate. All the symptoms disappeared under the employment of atropia and a pressure bandage and did not leave a trace behind. R. cannot find a satisfactory explanation for this phenomenon.

LAKER (203) increased the tension of eyeballs of corpses considerably by injections of a solution of chloride of sodium. The lamina cribrosa was afterwards found to have bulged out, beginning at the scleral ring, the same as in glaucomatous excavation.

HIRSCHBERG (204) explains the rainbow colors seen in glaucoma by the diffraction of light caused by the slight haziness of the cornea. He proves his theory (1) by the spectral arrangement of the colored rings, (2) by the occasional appearance of a double spectrum, and (3) by the fact that the inner or blue zone, which is usually overlooked by the patients on account of its dimness, can be rendered very conspicuous by the employment of the electric light. This phenomenon may also be met with in glaucoma simplex, and occasionally even in the normal eye, if the pupil be very much distended. The periodic appearance of colored rings is characteristic for glaucoma, but must not be regarded as pathognomonic.

LUNDY (205) found that the sting of the bee entered at the insertion of the external rectus of the R eye. Excessive pain followed for several days, and sight gradually failed. When examined at the end of a week T + 3, and all the signs of acute inflammatory glaucoma. The eye was finally enucleated.

BURNETT.

According to MARTIN (206) the increase of tension in glaucoma changes the meridian of the corneal astigmatism. The degree of astigmatism increases and decreases in the same proportion as the degree of tension. In 45 % of all glaucomatous eyes M. found the direction of astigmatism to be the reverse of the typical one, whilst in eyes not affected with glaucoma only 1.3 % show an atypical direction of the meridian of astigmatism.

MARCKWORT.

ARMAIGNAC (207) saw very good results follow the combined application of cocaine and eserine in two cases of chronic glaucoma. He recommends the employment of this method in cases where the patients dread an operation and when the latter is not an urgent necessity. v. MITTELSTÄDT.

RICHEY (208) reports the case of a woman of thirty-seven, who had absolute glaucoma in the L and a simple glaucoma with typical symptoms in the R. V = $\frac{20}{200}$. Under eserine ($\frac{1}{4}$ gr. to $\frac{7}{3}$ i) twice a day, and general tonic treatment, V was brought up to $\frac{20}{40}$. The V. F. still remained contracted. BURNETT.

PANAS (209) reports four cases of glaucoma cured by the employment of myotic substances alone. According to Panas these substances are actually curative, and not only palliative, agents in certain forms of glaucoma, especially those cases which are not benefited by operative procedures. The applications must be continued for a considerable length of time.

MARCKWORT.

LANDESBERG (210) records his experience gained in ninety cases of glaucoma treated by sclerotomy, in many of which he was enabled to watch the result for a number of years. The results on the whole were favorable. There was complete success in different cases of simple, acute, and subacute glaucoma, as well as in acute exacerbation of absolute glaucoma.

GALEZOWSKI (211) also pronounces in favor of sclerochoriotomy which he performed in sixteen cases and with good results. He introduces a Graefe knife between the superior and the external rectus muscle at a distance of from 5 to 6 *mm* behind the ciliary circle, plunges it into the vitreous body, and carries the incision forward as far as the region of the ciliary circle. The wound is sutured with catgut. In buphthalmus Galezowski makes two such incisions parallel to each other, but without any sutures. MARCKWORT.

MASSELON (212) proposes posterior or equatorial sclerotomy for certain cases of glaucoma, and bases his proposition upon the following reasoning: In glaucoma there is hypersecretion. In many cases in which iridectomy is performed, the eye remains hard nevertheless, because the hypersecretion takes place in the vitreous chamber and the excess cannot be carried off on account of the communication between the vitreous and aqueous chambers being shut off by certain abnormal conditions. Hence it must appear a rational procedure to open the vitreous chamber. Guérin had already performed this operation successfully in the past century. In order to spare the vitreous body as much as possible the operation ought to be performed by making a puncture and counter-puncture with a Graefe knife between the external and the inferior rectus muscle in the ciliary region in such a way that the knife remains on the surface of the vitreous body. MARCKWORT.

LANDESBERG (213) publishes five cases in which he had performed iridectomy in one eye for glaucoma, and where the prodromic symptoms of glaucoma which had already made their

appearance in the other eye, disappeared after the operation performed on the first and without the application of any drugs. The eyes not operated on remained well permanently. Landesberg's observations run contrary to general experience. His patients were in the fifties. The time they were under observation was five years. L. believes that the cure was effected by sympathetic action.

JAVAL (214) observed an attack of glaucoma after the instillation of cocaine in an eye, the existence of the disease in which had been doubtful before the instillation. The glaucoma attack yielded to eserine. MARCKWORT.

## XV.—SYMPATHETIC OPHTHALMIA.

215. ALBINI, E. Nuove osservazioni di exenteratio bulbi. *Gazz. d. cliniche*, vol. xxiii., p. 18.

216. RAMPOLDI. Brevi considerazioni intorno ad un caso di ottalmia simpatica. *Ann. di ott.*, vol. xv., 1, p. 32.

217. GALEZOWSKI. De l'épilepsie avec névrite optique guérie par l'énucléation d'un œil blessé. *Rev. d'ophth.*, June, 1886.

218. HOFFMANN, F. W. A case of sympathetic ophthalmia cured without enucleation. *Zehender's klin. Monatsb.*, April, 1886, p. 121.

219. GEPNER (Warsaw). A rare form of symp. ophth. *C. f. A.*, Bd. x., p. 138.

220. DIANOUX. Du traitement chirurgical de l'ophthalmie sympathique. *Soc. franç. d'ophth.*, 1886, April 27th; *Ann. d'ocul.*, vol xcv., p. 200.

221. GUAITA. Exenterazione del globo oculare. Processo operativo. *Ann. di ott.*, vol. xiv., 5 and 6.

ALBINI (215) reports a new series of eight cases of exenteration performed by Reymond, six of which healed without any noticeable reaction, so that an artificial eye could be inserted at the end of from seven to eleven days. In the two remaining cases the operation was performed on account of panophthalmitis after severe injury, and the healing process took longer because the sclerotic sloughed, and there was considerable suppuration. This accident has never been observed before, and Albini thinks that it was due to the fact that the periocular connective tissue had been implicated in the panophthalmitic process. At the expiration of

four weeks the orbita, being lined with conjunctiva, presented the same appearance as if enucleation had been performed.

DANTONE.

In the case of RAMPOLDI (216), sympathetic inflammation developed, whilst the eyeball primarily affected remained free from irritation. There had been an injury of the cornea, iris, and lens by the penetration of a point of a pair of scissors, the traumatic tract had been operated for, and the eye saw better than the one affected by sympathy. For this reason enucleation was not proposed, but instead of it iridectomy was performed upon both eyes. Although there was atrophic degeneration of the iris in both eyes, and the operation could only be carried out piecemeal, the visual power of the eye sympathetically affected improved considerably, and remained satisfactory during two months, the time during which the case was kept under observation. DANTONE.

GALEZOWSKI (217) describes a case of epilepsy and neuritis of the optic nerve of one eye, caused by the irritated stump of the other eye. A gentleman forty years of age had met with an injury of the right eye six years ago, for which abscission of the anterior half of the globe had been performed. During the course of the last six months he had had frequent epileptic seizures, and the sight of his left eye had failed. Galezowski found neuro-retinitis with venous congestion, perivascular infiltration, and hemorrhagic foci along the course of the retinal vessels. The stump of the right eyeball was sensitive to pressure. After its removal the epileptic attacks disappeared, and the sight of the left eye improved considerably. According to Galezowski, the sympathetic affection is caused by vaso-motor reflex. MARCKWORT.

HOFFMANN (218) describes a case of sympathetic ophthalmia cured without enucleation. A woman, æt. fifty-five, had one eye operated upon for cataract. The same eye was attacked afterwards by irido-cyclitis with hypopyon, for which iridotomy was performed without success. The other eye then became affected with serous iritis, which subsided temporarily, but relapsed repeatedly until it was finally conquered by iridectomy and mercurial inunctions. After the lapse of two years the operation for the extraction of cataract was performed upon this eye, after which S was $= \frac{1}{4}$.

GEPNER (219) reports a case of sympathetic ophthalmia which occurred in the case of a locksmith twenty-five years of age, who had carried a splinter of brass in the retina of one eye for three

months. The splinter caused choroiditis of the same eye and sympathetic œdema of the optic nerve and the retina of the other eye, with considerable diminution of S. Enucleation of the globe first affected soon caused the permanent disappearance of these symptoms ; the retina, however, did not regain its transparency.

DIANOUX (220) recommends enervation for the prevention or cure of sympathetic ophthalmitis. Out of forty cases operated upon, ciliary pain persisted in one only. In several of these cases the sympathetic inflammation was fully developed at the time of the operation. Abadie prefers enucleation. De Wecker condemns enervation, but is as yet undecided as regards the question of enucleation, *vs.* evisceration. Juarez recommends enucleation for cases of pronounced sympathetic inflammation, but does not object to enervation in doubtful cases. Boucheron holds that enervation must be performed before the appearance of the first symptoms of sympathetic ophthalmia since the operation is never successful afterwards. Dransart has performed enervation in fourteen cases and with success, but has abandoned the method since Poncet demonstrated the reunion of the divided nerves. Galezowski and Coursserant are decided partisans of enucleation.

MARCKWORT.

GUAITA (221) performed evisceration, according to Alfred Graefe, in two cases. In both cases the pain lasted for one week. In one case the stump continued to suppurate for twenty days, and in the other for four weeks. In a third case Guaita changed the method of precedure by dividing the sclerotic at a distance of 4 *mm* behind the corneal margin behind the ciliary body, and evacuating the contents of the globe by means of a sponge instead of a spoon. In this case the pain ceased at the expiration of twenty-four hours. The wound which had been united by a purse-string suture, healed by first intention in six days, and without the formation of a single drop of pus. DANTONE.

## XVI.—LENS.

222. DE WECKER. Etiologie de la cataracte. *Revue clin. d' ocul.*, 1885, 11 and 12.

223. MEYHÖFER. Etiology of cataract, especially in glass-blowers. *Zehender's klin. Monatsbl.*, Feb., 1886, p. 49.

224. AYRES, S. C. Cataracta pyramidalis. *Amer. Journ. of Ophth.*, Jan., 1886.

225. WARLOMONT. L'extraction de la cataracte, vingt-cinq années de son histoire. *Ann. d'ocul.*, 1886, Jan.–Feb., p. 5.

226. CHISOLM, J. J. The rational method of treating cataract patients to the exclusion of compresses, bandages, and dark rooms. *Amer. Journ. of Ophth.*, June, 1886.

227. LAWRENTJEW. A slight modification in the method of extracting cataracts. *Wjestnik ophth.*, March–April, 1886.

228. BETTREMIEUX. Étude sur l'extraction de la cataracte. (Suite.) *Arch. d' ophth.*, vol. vi., No. 3, May–June, 1886, p. 268.

229. BETTREMIEUX. Étude sur l'extraction de la cataracte, indications de l'iridectomie, et recherches sur l'antisepsie opératoire. *Thèse de Paris*, 1886.

230. GALEZOWSKI. Sur la plaie cornéenne dans l'extraction de la cataracte et sur les moyens de prévenir sa suppuration. *Soc. franç. d'ophth.*, 1886 ; *Ann. d'ocul.*, vol. xcv., p. 225.

231. DE WECKER. L'avenir de l'extraction linéaire et de l'extraction à lambeau. *Ann. d'ocul.*, vol. xcv., p. 245. (Claim of priority.)

232. DE WECKER. Injections et pansements à l'éserine et antisepsie oculaire. *Ann. d'ocul.*, vol. xcv., p. 121 and 236.

233. WICHERKIEWICZ. Sur l'irrigation des chambres de l'œil pour l'extraction de la cataracte. *Soc. franç. d'ophth.*, 1886, April 30th ; *Ann. d'ocul.*, vol. xcv., p. 224.

234. GAYET. De la kératokystitomie dans l'opération de la cataracte. *Soc. franç. d'ophth.*, April 30, 1886 ; *Ann. d'ocul.*, vol., xcv., p. 227.

235. GUNNING. Sur la maturation de la cataracte. *Soc. franç d'ophth. ; Ann. d'ocul.*, vol. xcv., p. 226.

236. CHIBRET. Lois des déformations astigmatiques de la cornée consécutives à l'opération de la cataracte. *Soc. franç. d' ophth. ; Ann. d'ocul.*, vol. xcv., p. 209.

DE WECKER (222) reviews the different theories about the etiology of cataract which have been recently advanced. He regards the trouble as analogous to gangrene and distinguishes two forms : (1) Dry gangrene, where the cataract is hard and the nucleus not well defined. (2) Moist gangrene, in cataracta nuclearis with well-defined nucleus. MARCKWORT.

MEYHÖFER (223) thinks that cataract may be caused by radiat-

ing heat, and substantiates his opinion by four cases which he has observed in young glass-blowers of from twenty-four to twenty-nine years of age. He afterwards examined 506 glass-blowers and found opacities of the lens in 59 individuals, 42 of whom were under forty years of age. The left eye, which is the one nearest to the furnace, was found to be affected oftener than the other. Besides the radiating heat itself, Meyhöfer also considers the increased perspiration as an etiological factor in the production of cataract.

AYRES (224) relates two cases; in one the cataracts became complete, and one of them was successfully extracted; in the other a double iridectomy was made with excellent visual result.

BURNETT.

WARLOMONT (225) gives a short sketch of the history of cataract-extraction during the last twenty-five years. He does not state his own views distinctly, but he seems to be in sympathy with a number of French oculists who are in favor of abandoning the combined method of extraction. MARCKWORT.

CHISOLM (226) has abandoned dark rooms and bandages and simply closes the lids of his cataract patients with isinglass plaster, thereby increasing the comfort of the patient and diminishing the irritability so common after such operations. We can heartily agree with the author, for we have ourselves for more than two years been treating our cataract-operations in the open wards of a general hospital. Neither is the closure of the eyes with adhesive straps new, for we saw it done in Manchester ten years ago. BURNETT.

After performing the incision in the sclero-corneal margin, LAWRENTJEW (227) introduces a sharp hook into the anterior chamber, with which he tears the capsule from the lower pupillary margin upwards. In removing the instrument he hooks the iris, which he then cuts in the usual manner. HIRSCHMANN.

BETTREMIEUX (228) draws the following conclusions: (1) For the majority of cases of senile cataract Daviel's method of extraction is the only "classical" one. (2) The method of von Graefe, of which iridectomy is an integral feature, is suited for a certain class of cases only. (3) Iridectomy is indicated (*a*) as a preliminary operation for maturation, for optical purposes, and in certain complicated forms of cataract; (*b*) immediately before the delivery of the lens, when the iris presents an obstacle to the delivery, and when the patient is restless; (*c*) immediately after the delivery of

the lens, if the iris has been bruised or cannot be replaced; and (*d*) some time after extraction, if there be prolapse of the iris. (4) In order to prevent suppuration it is necessary, besides the usual antiseptic precautions, to wash out the anterior chamber. Bettremieux recommends the antiseptic liquid of Panas (biniodide of mercury 1 to 20,000 with 2 p. c. of alcohol) and a 3-p.-c. solution of boric acid. In experiments made upon animals the latter solution was borne better, but its efficiency as an antiseptic is only one half as great as that of Panas' liquid. v. MITTELSTÄDT.

DE WECKER (232) recommends that after simple linear extraction without iridectomy the anterior chamber be syringed out with a solution of eserine (eserine salicylate 0.25, boric acid 4.0, distilled water 100) and that the bandage remain saturated with this solution for the first four days after the operation. This procedure has the following advantages: (1) Prolapse of the iris is prevented by the action of the drug. (2) Remnants of cortical substance which may have stayed behind will be removed. (3) It helps to re-establish the angle of the iris, and (4) to suppress conjunctival secretion. De Wecker discusses at length the recommendations of St. Yves, Heymann, Inouye, McKeown, Wicherkiewicz, and Panas as regards the way to wash out the anterior chamber. MARCKWORT.

WICHERKIEWICZ (233) deprecates the method commonly employed for the purpose of ripening immature cataracts. His procedure consists in flooding the anterior and posterior chambers with a solution of chloride of sodium of the strength of 7 to 1,000, which has been boiled and allowed to cool down to 30° C. (See Wicherkiewicz, *Klin. Monatsbl.*, Nov., 1885.) MARCKWORT.

GAYET (234) proposes that the anterior capsule be opened with the Graefe knife itself after its introduction into the anterior chamber. Chibret pleads for the exsection of the sphincter, whilst Abadie claims that all oculists (tout le monde) are now agreed that the operation without iridectomy is superior to that combined with iridectomy. MARCKWORT.

GUNNING (235) does not perform iridectomy when carrying out Förster's procedure for ripening immature cataracts. He merely punctures the cornea and then triturates the lens. MARCKWORT.

According to CHIBRET (236) cataract-operations are followed by what he terms "astigmatisme mixte isocèle." While one of the principal meridians becomes hyperopic, the other becomes

myopic to the same degree. For instance: A cornea has 40 dioptries in both its principal meridians before the operation, or 40 0° + 0. After the operation this changes to 37 90° + 6. In other words the vertical meridian has become hyperopic 3 dioptries, whilst the horizontal meridian has become myopic 3 dioptries. There is mixed astigmatism of 6 dioptries, the two components, as divided between the two principal meridians, being equal in degree. MARCKWORT.

## XVII.—VITREOUS BODY.

237. ABADIE. Des hémorrhagies profuses du fond de l'œil chez les jeunes gens. *Ann. d'ocul.*, 1886, Jan. and Feb., p. 36.

238. RAMPOLDI. Ulteriori notizie e considerazioni intorno a un memorabile caso clinico. *Ann. di ottalm.*, vol. xv., 1, p. 11.

239. CHISOLM, J. J. A piece of iris living in the vitreous chamber—a novel foreign body. *N. Y. Med. Record*, Jan. 23, 1886.

ABADIE (237) draws attention to hemorrhages which occur in the fundus oculi of young persons. In two cases epistaxis preceded the ocular hemorrhage. The white blood corpuscles were diminished in number. Vision was entirely abolished for one day and longer. In one case, which afforded the rare opportunity of watching the process in an early stage, the ophthalmoscope showed fine hemorrhagic striæ along the course of the blood-vessels, which increased slowly in number as well as in width, and gradually covered the optic disc and the adjacent area of the retina in the form of broad patches which extended as far as the equatorial region. The vitreous body soon became opaque at the posterior pole whereby the hemorrhages were shut out of sight. The periphery was comparatively free. (Compare the observations of Eales and Nieden.) MARCKWORT.

RAMPOLDI (238), who five years ago published a remarkable case of lymphatic infiltration of the cornea on inclination of the head, has subjected the patient to a renewed examination. The symptoms which she complained of at the time, especially the transitory opacity of the cornea, have not returned, but the patient now complains of a movable, thread-like scotoma before the left eye. With the ophthalmoscope a cord-like structure can be seen, which originates from the arteria centralis retinæ and ramifies in the posterior third of the vitreous chamber. The color of this

structure is red until the first division, beyond that it is of an ashy gray. Rampoldi considers it to be the canalis hyaloideus, rendered visible by being filled with opaque lymph. DANTONE.

CHISOLM'S (239) patient was injured by a fall in which a splinter of wood entered the right eye. The eye presented the appearance of a successful cataract-extraction—pupil black with some slight capsular opacities. In the vitreous chamber behind the capsular opacity there was a flap of membrane, about one line wide and two lines long, rectangular in shape, and yellowish-white; it moved to and from with the movement of the eye. BURNETT.

## XVIII.—RETINA AND FUNCTIONAL DISTURBANCES.

240. ANDERSON. A case of relapsing neuritis. *Ophth. Review*, vol. v., June, 1886, p. 121.

241. AYRES, S. C. Retinitis pigmentosa. *Amer. Journ. of Ophth.*, April, 1886.

242. SNELL. Retinitis pigmentosa and nyctalopia. *Ophth. Rev.*, vol. v., March, 1886, p. 72.

243. HIRSCHBERG, J. The development of ret. diff. spec. *C. f. A.*, Bd. x., p. 92.

244. HIRSCHBERG, J. Congenital syphilis the cause of severe ocular affections. *C. f. A.*, Bd. x., p. 97.

245. PERLIA (of Reuss' clinique). The ring-scotoma in syphilitic chorio-retinitis. *C. f. A.*, Bd. x., p. 39.

246. HAAB. Arteriitis syphilitica. *Correspondenzbl. f. Schweizer Aerzte*, March 15, 1886, No. 6.

247. DRANSART. De l'iridectomie dans le décollement de la rétine. *Soc. franç. d'ophth.*, 1886, April 29th; *Ann. d'ocul.*, vol. xcv., p. 222.

248. WARLOMONT. Décollement de la rétine et iridectomie. *Ann. d'ocul.*, vol. xcv., p. 153.

249. BENSON. Partial embolism of superior division of arteria centralis retinæ. *Ophth. Rev.*, vol. v., Dec., 1885., p. 1.

250. DUMONT. Nevrorétinite double. Plaques de chorio-rétinite. Hémiopie. *Bull. de la clinique nat. ophth. de l'hôp. des quinze-vingts*, vol. iv., No. 2, p. 86.

251. DA GAMA PINTO, J. R. Investigations on intraocular tumors. Glioma of the retina. Wiesbaden: J. F. Bergmann, 1886; 99 pages and 6 chromo-lithographs.

252. STRAUB, M. The gliomas of the organ of sight. Path.-anat. Studie aus d. Nederl. Gasth. voor Ooglyders in Utrecht. *v. Graefe's Arch. f. O.*, Bd. xxxii., 1, p. 205.

253. TREITEL, TH. Contribution to the knowledge of glioma retinæ. *v. Graefe's Arch. f. O.*, Bd. xxxii., 1, p. 151.

254. BETTMANN, BOERNE. Blindness following hemorrhage. *Trans. Chicago Soc. of Ophth. and Otology*, 1886.

255. ANKE, RICHARD (of Hirschberg's clinique). Night-blindness from hemorrhage during pregnancy. *C. f. A.*, Bd. x., p. 37.

256. TEILLAIS. De quelques hémorrhagies oculaires pendant la grossesse. *Soc. franç. d'ophth.*, 1886, April 28th; *Ann. d'ocul.*, vol. xcv., p. 213.

257. DE LUCA. Dell' ecclissi visivo. *Comm. alla R. academ. med. chir. di Napoli*, January, 1886.

258. SEGUIN, E. C. A contribution to the pathology of hemianopsia of central origin (cortex hemianopsia). *Journ. of Nervous and Mental Disease*, Jan., 1886.

259. V. MILLINGEN (Constantinople). Partial affection of the chiasma. *C. f. A.*, Bd. x., p. 167.

260. BERGMEISTER, O. On toxic amblyopia. *Wiener med. Blätter*, 1886, 5 to 8.

261. MAGNUS, H. Case of transient amaurosis. *Zehender's klin. Monatsbl.*, Feb., 1886.

262. STANDISH, MYLES. A case of alcoholic paralysis preceded by and accompanied with amblyopia ex abusu, with remarks. *Boston Med. and Surg. Journ.*, April 22, 1886.

263. MINOR, J. L. The present standing of tobacco amblyopia. *Amer. Journ. Ophth.*, Feb., 1886.

264. DEEREN. Amblyopie paludéenne, guérie par l'emploi de sulfate de quinine. *Rev. d'ophth.*, 1886, May, p. 276.

265. TEILLAIS. De l'amblyopie par l'intoxication paludéenne. *Soc. franç. d'ophth.*, 1886, April 30th; *Ann. d'ocul.*, vol. xcv., p. 234.

266. CHANGARNIER. Amblyopie par le sulfure de carbone. *Rec. d'ophth.*, 1886, May, p. 280.

267. GAND. Amblyopie toxique (sulfure de carbone). *Bull. de la clin. nat. ophth. des quinze-vingts*, vol. iv., No. 1, Jan. to March, 1886, p. 40.

ANDERSON (240) reports a case of relapsing neuritis in a girl

seventeen years of age, who complained of squinting, diplopia, and weakness of the lower extremities. This weakness had begun a year ago, and after having lasted for several months, it was noticed to have suddenly increased in the left leg one morning, on her getting out of bed, causing her to fall to the ground. There was no loss of consciousness. Two months later severe nausea supervened, but without headache or photophobia. She was annoyed by tinnitus in the left side of the head, resembling the singing of birds, and chromatopsia. The diplopia, which was homonymous, persisted. On being examined at the time of her admission to the hospital, astigmatism was detected. This having been neutralized by glasses, S proved to be = 1. The ophthalmoscope showed neuritis optica in both eyes. Although the patient was right-handed, pressure of her left hand was stronger than of her right. There was no disturbance of general sensibility, smell, or hearing; no paralysis of the tongue, the facial nerve, or the faculty of speech. Both patellar reflex and ankle clonus were absent. All the symptoms improved gradually, but a certain degree of strabismus of the right eye remained. After having remained in a satisfactory condition for over a year, she was again attacked with nausea, this time coupled with left-sided frontal headache, sore throat, and stiffness of the left side of the neck. S was normal; no neuritis or paralysis. Tinnitus again set in on the left side, and after the lapse of a few days marked neuritis of both optic nerves again showed itself. At a certain place in front of the left ear, where the patient located her subjective sensations of hearing, an objective sound could also be made out which was synchronous with the carotid pulse. This symptom gradually subsided, and after two months' treatment she was discharged from the hospital completely cured. Anderson's diagnosis in this case is tumor of the brain, and he expects that sooner or later new symptoms will develop. FITZGERALD.

AYRES (241) presents a statistical report of twenty-five cases, including nineteen families. There were eighteen males and seven females (28 per cent). Parents were related in 20 per cent. of cases; not related in 24 per cent. In 56 per cent. no record of relationship was taken. In eight families there were other ocular defects in some of the members. In three cases there was a tendency to glaucoma. BURNETT.

SNELL (242) observed night-blindness and retinitis pigmentosa in six brothers. A sister of theirs and another brother, who was

the youngest of the family, had perfectly normal eyes. The parents were not related. Neither they nor their progenitors had any similar trouble. FITZGERALD.

HIRSCHBERG (243) assumes that there are several different forms of syphilitic retinitis. He gives an elaborate description of the symptoms and the course of a case of retinitis diffusa specifica of one eye. There were round, sharply defined, grayish-blue marginal arches, and a small hemorrhage at a distance of from four to five disc-diameters from the entrance of the optic nerve, both laterally and in a median direction. An extensive scotoma corresponded to the opaque portion of the retina.

HIRSCHBERG (244) publishes also three cases of affections of the eye due to congenital syphilis. (1) The first was that of a boy sixteen years of age, who was first attacked with panophthalmitis sicca in one eye, with detachment of the retina. After a short period of improvement diffuse parenchymatous keratitis made its appearance, which trouble also developed in the other eye, which had hitherto remained sound. The eyeball first affected became totally blind and painful, and was enucleated. In spite of this, and of mercurial inunctions, the other eye continued to grow worse. Symptoms of glaucoma now supervened, and iridectomy was performed, after which the cornea cleared up. A microscopic description of the eye enucleated is given. (2) In a twelve-year old girl with atrophy of the optic nerve of one eye in consequence of specific neuritis, the same affection began to develop in the other eye. This was followed by kerato-iritis diffusa, which healed under the influence of mercury. A gummous tumor of the sternum, which developed a year later, confirmed the diagnosis previously made. (3) A case of chronic iritis, with slight opacities in the vitreous, in a boy five months old, was cured by inunction.

HAAB (246) also observed a case of retinitis syphilitica, termed by him "arteriitis syphilitica," of one eye. Cured by mercury.

DRANSART (247), Warlomont, Chibret, and Martin recommend iridectomy for detachment of the retina. Galezowski has experienced only temporary improvement.

WARLOMONT (248) reports a case of detachment of the retina cured by iridectomy, pressure bandage, supine position, and injections of pilocarpine. (Whether the cure continued or not after the patient got up again and the bandage was left off, is not stated.—M.) MARCKWORT.

BENSON'S (249) case was that of a young man twenty-three years of age; whose right eye became blind suddenly. After the lapse of a few minutes vision returned in the lower half of the visual field, the upper half remaining blind. With the ophthalmoscope the lower portion of the retina appeared œdematous. After infiltration had become absorbed, a small flame-shaped hemorrhage could be seen near the outer lower portion of the periphery of the disc. Later on only slight vascular changes could be made out at this place. The patient had rheumatism four and one half years ago, and since that time had been attacked with chorea at three different times, the attack each time beginning on the left side. There was evidently some connection between these three morbid manifestations.

FITZGERALD.

In DUMONT'S (250) case the patient was probably syphilitic. After severe headache and epileptiform convulsions, paresis of both legs, more marked on the right side, and left-sided hemianopsia developed. v. MITTELSTÄDT.

PINTO (251) has made a microscopic examination of twelve cases of glioma of the retina. He gives a comprehensive review of the literature, and furnishes a clear anatomical and clinical picture of this affection. Pinto is inclined to agree with Hirschberg in regarding the inner granular layer as the usual starting-point of the disease, but does not consider this view to have been proved beyond any doubt. In one case the neoplasm had involved the lens-capsule and the interior of the lens. The description of this unique case is of particular interest. For details we must refer the reader to the original.

STRAUB'S (252) paper is an anatomo-pathological essay on glioma of the visual organ, based upon the examination of two cases of glioma of the retina, and of one of the optic nerve. He comes to the conclusion that this neoplasm originates in the connective tissue peculiar to the nervous system, as distinguished from ordinary connective tissue. The distinctive features between these two forms of connective tissue continue to be marked in pathological growths. Straub also aims at an exact separation between glioma and sarcoma. Sarcoma originates from cells derived from the mesoblast, and the walls of its vessels, which are embryonic in character, are formed by sarcomatous tissue. Glioma, being composed of neuroglia, is ultimately derived from the epiblast.

TREITEL (253) publishes the history of an interesting case of congenital glioma of the retina in a boy two years and nine months old, with the results of a post-mortem examination. The neoplasm first appeared in the left eyeball and led to perforation of the globe. Enucleation was speedily followed by a relapse, whereupon exenteration of the orbit was performed. The child died shortly afterwards from meningitis. At this time the ophthalmoscope had already revealed papillitis and a subretinal tumor in the anterior inner quadrant of the right eye. The whole vitreous body was studded with numerous small nodules, which proved under the microscope to be gliomatous foci. Treitel assumes that the vitreous became infected with glioma by the way of the fœtal hyaloid blood-vessels.

BETTMANN (254) relates two cases in full. The author is of the opinion that in such cases the bleeding from the stomach, gums, etc., is not the direct cause of the blindness, but that there is a concurrent hemorrhage bearing directly upon the optic tract.

BURNETT.

ANKE (255) observed the development of hemeralopia after copious hemorrhages from the vagina of a woman in the ninth month of pregnancy. There was concentric limitation of the field of vision for white as well as for colors, and the appearance of a fog before the eyes before night set in. With the ophthalmoscope no changes could be detected.

TEILLAIS (256) reports four cases of retinal hemorrhage during pregnancy. There was no heart disease, and the urine contained neither albumen nor sugar. The hemorrhages disappeared after delivery without leaving any ophthalmoscopic traces, and vision was fully restored.

MARCKWORT.

In addition to his own case, whose history and autoptic findings are given in full, SEGUIN (258) has collected and tabulated all the other cases he has been able to find in which an autopsy was made, with five traumatic cases, making in all forty-six cases of central hemianopsia. His conclusions from a close study of these histories are: "1. That lesions in the mesal aspect of the temporal lobes, or even in the other basal districts of the hemispheres, may give rise to hemianopsia indirectly by pressing upon the primary optic centres or upon the tractus optici and chiasm. 2. That lesions of the corpus geniculatum lat., pulvinar, and latero-caudal parts of the thalamus may cause hemianopsia, or hemianæsthesia alone. 3. That a lesion of the white substance of

the occipital lobe, in the caudal radiations of the internal capsule, may cause hemianopsia alone, or with hemianæsthesia. 4. That lesions of the supramarginal gyrus, angular gyrus, and inferior occipital lobule with the subjacent white substance, may cause hemianopsia—with or without other symptoms (hemiplegia, loss of muscular sense, word-deafness, etc.). 5. That a lesion of greater extent, involving the speech centre, the motor convolutions, and the parts enumerated above (4), due usually to embolism or thrombosis of the entire Sylvian artery, will, when existing on the left side, produce aphasia, hemianopsia, and hemiplegia. 6. That lesions of the occipital lobe, cortex, and subjacent white matter produce blindness when bilateral, and hemianopsia when unilateral. This conclusion is in accord with Exner (1881). 7. That a lesion of the cuneus and adjacent 5th temporal gyrus (Ecker) on one side produces lateral hemianopsia of the opposite side." BURNETT.

A girl of thirteen seen by MAGNUS (261) was suddenly attacked with amaurosis of both eyes without any ophthalmoscopic or general symptoms. After persisting for four months in spite of treatment, the amaurosis suddenly subsided in the course of one day. It is said that simulation could be excluded.

v. MILLINGEN (259) observed amaurosis and papillitis of the left eye and temporal hemianopsia of the right eye in a child six years of age with caries at the base of the skull. The right optic disc was almost perfectly normal. The author assumes that the chiasma was partially destroyed, but that the right temporal strand had escaped destruction. There was no autopsy.

BERGMEISTER (260) discusses the different forms of amblyopia produced by poisonous substances. Acute forms of amblyopia may be produced by quinine, santonine, salicylic acid, and bromide of potassium. The following substances cause chronic forms of amblyopia: Alcohol and tobacco (each separately and independently of the other), bisulphide of carbon and of chlorine, lead (either without any ophthalmoscopic changes, or with neuritis and retinitis and albumen in the urine), carbolic acid, santonine, osmic acid, opium, hasheesh, and snake poison.

The interesting feature about STANDISH'S (262) case, which was watched and reported very carefully, is that the use of a small amount of tobacco was sufficient to cause a relapse. The author is of the opinion that in the majority of cases tobacco is only an assisting cause of the amblyopia, the principal cause being the alcohol—and statistics are presented to that effect. BURNETT.

MINOR (263) doubts the existence of a true tobacco amaurosis, and relates ten cases in which amaurosis was the marked symptom in heavy smokers. In all there was either complete restitution or great improvement in vision under iodide of potassium and strychnia—no reduction in the amount of tobacco consumed being made. BURNETT.

DEEREN (264) describes a case of amblyopia caused by malaria. The main symptom was anæmia of the optic discs. The pupils were equal; the retina, choroid, and vitreous body were intact. Sulphate of quinine raised S from $\frac{4}{20}$ to $\frac{8}{20}$. MARCKWORT.

TEILLAIS (265) distinguishes three forms of amblyopia due to the influence of malaria: 1. Amblyopia without any visible changes, caused by the specific action of the poison upon the optic nerve and retina. 2. Amblyopia caused by other disturbances, the nature of which can as yet not be accurately determined. 3. Amblyopia with visible changes in the background of the eye. According to Poncet amblyopia is frequent in malaria. The retina becomes permeated with pigment, and there are embolic foci in the choroidal vessels. MARCKWORT.

CHANGARNIER (266) describes two cases of amblyopia in consequence of poisoning with bisulphide of carbon. The cases resembled those caused by alcohol and tobacco, but differed in so far as the vision of the patients was colored yellow or whitish-yellow. MARCKWORT.

The two cases of GAND (267) were those of workmen in a rubber manufactory. The influence of alcohol and tobacco as well as tabes could be excluded. In one case there were general symptoms, headache, vomiting, etc. In both cases S sank rapidly within the course of two months. The visual field for white was normal in both cases, and in one case also that for colors, whilst the other became completely color-blind. There was ischæmia of the optic discs. Nothing is said about the ultimate condition of the patients. V. MITTELSTÄDT.

## XIX.—OPTIC NERVE.

268. GUIOT. Atrophie grise double consécutive à un abscès du sinus maxillaire. Guérison. *Bull. de la clinique nat. ophth. des quinze-vingts*, vol. iv., 1, No. 1, Jan.–March, p. 36.

269. PELTESOHN. Causes and course of atrophy of the optic nerve. *C. f. A.*, Bd. x., pp. 45, 75, and 106.

270. PERLIA. Contribution to acute rheumatic neuritis retrobulbaris. *Zehender's klin. Monatsb.*, April, 1886, p. 139.

271. DUMONT. Fracture de la base du crâne. Atrophie des nerfs optiques. *Bull. de la clin. nat. ophth. de l'hôp. des quinze-vingts*, vol. iv. p. 84.

GUIOT's (268) case was that of a stab wound behind the left ear. After the wound had healed the maxillary sinus began to suppurate. There was ischæmia of the optic discs and failing of S. After evacuation of the pus, all symptoms disappeared.

v. MITTELSTÄDT.

PELTESOHN (269) has tabulated 98 cases of spinal or cerebro-spinal atrophy of the optic nerve, which number forms 39.5 % of all cases (496) of optic-nerve atrophy observed at Hirschberg's clinique. There are 78 cases of tabes in the series. For an elaborate description of the symptoms, and for interesting details, the reader is referred to the original.

PERLIA (270) treated a locomotive engineer for acute rheumatic retrobulbar neuritis, which first attacked the right side and then the left. The characteristic features observed were pain on moving the eyeball in any direction and absence of ophthalmoscopic changes. He was cured by mercurial inunctions while confined to a darkened room.

In DUMONT's (271) case there was a fracture of the base of the skull, which probably began on the left side, and involved the sella turcica and the right petrous bone. On the right side there was blindness, deafness, and paralysis of the facial nerve and of the sense of taste. On the left side there was amblyopia and temporal hemiopia. v. MITTELSTÄDT.

## XX.—INJURIES, FOREIGN BODIES, AND PARASITES.

272. LEBER, TH. Extractions of cysticercus and inflammations produced by the parasite; from observations at the ophthalmic clinic at Göttingen. *v. Graefe's Arch. f. Ophth.*, Bd. xxxii., 1, p. 281.

273. DE WECKER. On extractions of cysticerci. Reply to Prof. A. Gräfe's "Further Reports on Extraction of Cysticerci." *Arch. f. Ophth.*, Bd. xxxii., 1, p. 275.

LEBER (272) publishes a report of fifteen cases of extraction of cysticercus performed by him. The parasite was under the conjunctiva in one case only, in all others it was either in the vitreous

or under the retina. In two cases the diagnosis could not be made with certainty beforehand, on account of the turbidity of the refracting media. The operation proved a complete success in eleven cases, and a failure in three only. In two instances of failure the parasite was located in the vitreous chamber, and in one instance it was under the retina. Inflammation never set in. In one case S was restored to the normal standard. The improvement of S obtained in each separate case by the operation proved to be permanent. Attention was paid to the exact closure of the conjunctival wound. Culture experiments were made to detect the presence of microbes in the entozoic cyst, and in one case with success.

XXI.—OCULAR AFFECTIONS IN CONSTITUTIONAL DISEASES.

274. UHTHOFF. The diagnostic value of immobility of the pupil. *Berliner klin. Wochenschr.*, 1886, No. 3.

275. BORTHEN, LYDER. Ophthalmomalacie. *Rev. gén. d'ophth.*, 1886, January.

276. WHARTON SINKLER and C. A. OLIVER. Two cases of Friedreich's disease ; with a study of the ophthalmic symptoms. *Med. News*, July 4, 1885.

277. GENKIN. A case of ophthalmia neuroparalytica. *Trans. of the Med. Soc. of Kaluja-Russkaja, Medicina*, 1886, No. 9.

278. MOORE, W. O. Diseases of the eyes occurring in affections of the kidney. *N. Y. Med. Journ.*, April 17, 1886.

279. DEHENNE. Note sur l'emploi des injections souscutanées d'ergotine chez les diabétiques et les albuminuriques. *Un. méd.*, 1886, p. 529.

280. POOLEY, T. R. On the relation of uterine disease to asthenopia. *N. Y. Med. Journ.*, Feb. 13, 1886.

281. VULPIAN. Hémianesthésie alterne comme symptôme de certaines lésions du bulbe rachidien. *Progr. méd.*, 1886, p. 68.

282. BADAL. Recherches statistiques sur les manifestations oculaires de la syphilis. *Arch. d'ophth.*, vol. vi., No. 2, 1886, March–April, p. 104.

283. RAMPOLDI. Un caso di lebbra oculare. *Ann. di ott.*, vol. xiv., 5 and 6.

284. GRUENING, E. Reflex ocular symptoms in nasal disease. *N. Y. Med. Record*, Jan. 30, 1886.

285. NIEDEN, A. On the connection between affections of the eye and of the nose. *Arch. f. Augenh.*, vol. xvi., p. 381.

286. BURNETT, SWAN M. Affections of the eye accompanying mumps. *Amer. Journ. Med. Sci.*, Jan., 1886.

287. REDARD, P. Rapport entre les affections dentaires et certains troubles oculaires. *Rev. d'ocul.*, 7, A., No. 5, May, 1885, p. 102.

288. DRAKE BROCKMANN. Severe recurrent hemorrhage after excision of the eye on a scorbutic subject. *Ophth. Rev.*, vol. v., Feb., 1886, p. 40.

289. MAGNUS, H. Case of alopecia totalis. *Zehender's klin. Monatsbl.*, March, 1886, p. 97.

290. NIEDEN, A. Four cases of alopecia totalis persistens. *C. f. A.*, Bd. x., p. 123.

291. WICHERKIEWICZ. Report of cases of alopecia totalis. *Zehender's klin. Monatsbl.*, April, 1886.

UHTHOFF (274) examined the reflex pupillary mobility of a large number of patients suffering from different ailments, and tabulated 166 cases of reflex mobility. Among the patients suffering from tabes and presenting the phenomenon of iridoplegia reflectica, 25 per cent. had a difference in the pupil of both eyes.

BORTHEN (275) discusses the affection which has been termed "essential phthisis" by von Graefe and "ophthalmo-malacia" by Schmidt, and gives the history of one case which came under his own observation. A pressure bandage, applied during the course of treatment for lachrymal fistula, was the cause of the development of the disease in this instance. The symptoms were the following: ptosis, T–3, enophthalmos, pericorneal injection, cornea hazy and striated, and anterior chamber very narrow. The iris was normal and the pupil narrow. Two small white spots could be seen in the region of the macula. No pain. S $\frac{15}{200}$. Cured by instillations of atropia and leaving off the bandage.

A careful ophthalmic examination of one of these patients by Dr. OLIVER (276) showed the condition as follows: Pupils round, 3 *mm* in diameter, and responsive both to light and accommodation; good movements of eyes, no diplopia, slight horizontal nystagmus on extreme convergence and divergence, disc gray in its deeper layers, fundus otherwise normal. V = $\frac{6}{6}$ in both. There was slight "subnormal" color perception at the centre.

The V F for white was contracted in all meridians to from 20 to 30 degrees. The yellow field was bounded by 20 degrees, blue to 15 in R, 5 to 8 in L; red 5 degrees in all directions in R, 2 or 3 in L. BURNETT.

In GENKIN'S case (277) the patient was seventy years of age, his mind was affected, and he suffered from neuralgia of the left trifacial nerve. The left pupil was narrower than the right. Without any traumatism whatsoever the left cornea began to ulcerate and rapidly sloughed away. In this case the trigeminus was not anæsthetic, but hyperæstnetic. On post-mortem examination a syphilitic tumor of the sphenoid bone was found which pressed upon the fifth nerve. HIRSCHMANN.

In addition to a general consideration of the subject of albuminuric retinitis, MOORE (278) gives the history of one case in which an abortion, produced at the eighth month, relieved a woman of total blindness from this disease. BURNETT.

DUHENNE (279) recommends subcutaneous injections of ergot in diabetes, especially before making cataract-extractions in such patients. In two cases of albuminuria this treatment also resulted in considerable improvement. MARCKWORT.

POOLEY (280) gives the history of twenty cases of eye disease in which some uterine affection was the producing cause. The commoner symptom was asthenopia, but there was also, in some cases, organic change at the fundus, paleness of the disc, hemorrhages, etc. Paresis of A, blepharospasm, and deiplopia were also found. BURNETT.

BADAL'S (282) statistics comprise 20,000 cases of syphilis observed in Paris and Bordeaux. The eye was affected in 671 cases (3.3 %). A double curve represents the age of the patients when syphilis was acquired and that in which ocular symptoms made their appearance. Badal considers iritis as one of the early symptoms of syphilis, and advocates antispecific treatment from the time of the primary affection without delay. He places choroiditis into the transitional stage between the secondary and tertiary periods. Still the largest number of choroidal affections develop within the first year after the initial lesion. When choroiditis is found apparently to begin at a later period, it ought to be borne in mind that it really may be a relapse. The paper is to be continued. V. MITTELSTÄDT.

RAMPOLDI (283) observed the case of a patient who showed leprous nodules on his face and his extremities, and in the mucous

membrane of his mouth and pharynx. He treated him for exudation in the pupillary space and posterior synechiæ. He extirpated several pink nodules from the conjunctiva of the right eye near the cornea, in which the bacilli of lepra were found under the microscope. DANTONE.

GRUENING (284) gives the histories of eight cases in which a reflex relation between nasal and eye troubles was believed to exist. The features of the eye affections were: burning or smarting sensation in the eyes or lids, inability to fix an object in ordinary daylight, increased vascularity of the conjunctiva upon slight provocation, inefficiency of ocular or general treatment, efficiency of nasal treatment in spite of an absence of nasal symptoms. BURNETT.

NIEDEN'S (285) paper contains a discussion of the interdependence of certain affections of the eye and nose, illustrated by the histories of four cases. Among ophthalmologists v. Hasner has been the only author who has hitherto paid attention to this matter. On the other side Ziem, Bresgen, and other rhinologists have collected a great deal of material. It would seem important to determine the exact relation between ozæna, epiphora, and chronic ophthalmia. Many affections of the eye which have hitherto been ascribed to scrofula, have been found to owe their origin to a pre-existing rhinitis. Anisometropia is often due to difference in the capacity of the two orbital cavities, the difference being caused by long-continued obstruction of one nostril during the period of growth. The cases described were the following: (1) Polypi of the upper part of the nasal cavity perforating first into the left and afterwards also into the right orbit. Exophthalmus of both eyes. Death under cerebral symptoms. (2) Myxosarcoma of the mucous membrane of the upper part of the nasal cavity, perforating the lamina cribrosa and the os planum and invading first the cranial cavity and thence both orbital cavities; neuro-retinitis, ophthalmoplegia externa, bilateral exophthalmus, coma, death, autopsy. (3) Chronic empyema of the right frontal sinus and the ethmoid labyrinth, perforation into the right orbital cavity, dislocation of the right globe outwards and downwards, direct communication of the abscess with the nasal cavity. (4) Diffuse hypertrophy of the nasal mucous membrane, empyema of the maxillary sinus after typhoid fever, infraorbital neuralgia, blepharospasmus of the right side, evacuation and curetting of the nasal and maxillary cavities, resulting in cure.

BURNETT (286) found that, in a boy of fifteen, during an attack of mumps, there was on the right side exophthalmus, ptosis, dilatation of the pupil, paresis of accommodation with diminished movements of the ball upward and downward. V was reduced to $\frac{4}{18}$. There was swelling of the upper lid, clear chemosis of the conjunctiva, and marked tortuosity of the retinal veins. All the symptoms subsided, and V returned to $\frac{1}{2}$ when last seen. Abstracts of eleven other cases are given. BURNETT.

REDARD (287) speaks of the influence of affections of the teeth upon the production of disturbances of the eye. Dental affections may produce pain and inflammation in the eye as well as amblyopia, amaurosis, cloudiness of the field of vision, spasm or paralysis of the ciliary muscle, or of other ocular muscles, and asthenopia. Redard reports a case of glaucoma in which Abadie performed sclerotomy twice without result. A painful root was now extracted on the same side on which the eye was affected, and the tension of the eye diminished considerably. v. MITTELSTÄDT.

BROCKMANN'S (288) case was that of a scorbutic patient in whom one eyeball had to be excised. He had repeated hemorrhages from the wound at intervals of two weeks, which ceased only after anti-scorbutic treatment had been instituted.

FITZGERALD.

MAGNUS (289), NIEDEN (290), and WICHERKIEWICZ (291) publish cases of alopecia totalis which occurred in children and in adults. All the hairs of the head, eyes, nostrils, beard, chest, and pubes fell out for some cause which could not be determined. This condition remained permanent. There was no paræsthesia anywhere. The nails remained unaffected. The offspring of the patients showed a healthy growth of hair.

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## MISCELLANEOUS NOTES.

Dr. E. WILLIAMS, of Cincinnati, has resigned, on account of ill health, the presidency of the ophthalmological section at the next International Medical Congress. Dr. J. J. CHISHOLM, of Baltimore, has been appointed president, and Dr. A. ALT, of St. Louis, secretary of the section.

Prof. FERDINAND VON ARLT, of Vienna, and Prof. FRIEDRICH HORNER, of Zurich, are dead. Obituaries in our next number.

Fig. 1.

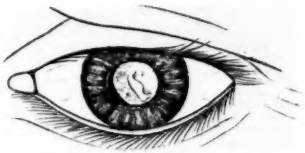
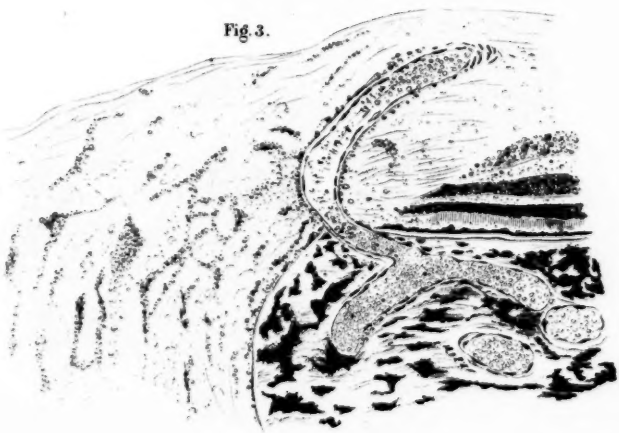


Fig. 2.

Fig. 3.





Lith. Anst. v. C. Kirst, Leipzig.